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Original Contributions.

SOME PATHOLOGIC FEATURES OF THE PULP.

BY V. A. LATHAM, M.D., D.D.S., F.R.M.S., CHICAGO. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, AT BOSTON, 1906, AND PUBLISHED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

In offering for consideration a few ideas on the diseases of the pulp, I do not mean to infer that its pathology differs from that of any other part of the body. As a general rule, inflammation presents the same set of phenomena wherever it is situated, subject to the variations peculiar to the organ in its especial location. We must never forget that disease of an organ is seldom or never a local affair; in other words, its effects are far-reaching and other structures must always become involved. In teaching the subject, this point is one that is very difficult to impress on a student's mind, for collateral anatomy, physiology and pathology seem to be forgotten in studies in the special structure under consideration. A simple carious cavity is not the only thing by which to diagnosticate a patient's suffering.

HISTOLOGY OF THE PULP.

The histology and pathology of the pulp are simple, in some ways, yet at the same time very difficult. The structure of the pulp is not analogous to any other permanent tissue of the body. It has been likened to the umbilical cord or Wharton's jelly. Certainly the varieties of cells are many and their anastomosing processes are very difficult to demonstrate with the ordinary stains. If they are true connective tissue, Van Gieson's method should give the red reaction, but it does not, even with the coarser fibers for which it is best applicable. In some special cases in which the pulp is of a firmer structure, almost fibroid, it is excellent.

In earlier cases, as in the growing pulp, I have had better re-

sults with Ribbert's phosphomolybdic-acid-hematoxylin stain after alcoholic fixation which shows the finest fibers of connective tissue, if present. In fetal sections, the method of staining with sulph-indigotate of sodium and carmin is excellent.

The great difficulty that I have encountered in my work has been to determine what comprises a normal pulp. As yet the histology is incomplete, and if we compare structures in sections taken at different periods of life we find a difference in them, especially in the first molars, which have non-striped muscle fibers.

Fig. 1.—Hyperemia of pulp. Stasis in vessels. Cells just trying to escape through walls. Note nodes of Ranvier in nerve fiber bundles. Myelin collecting in masses and degenerating.

So far it has not been easy to obtain freshly extracted teeth at stated periods so as to make a study from an average of a number of cases of healthy persons. According to Dentz, those extracted for irregularities are abnormal in many cases. From this it will be seen that it is sometimes difficult to find a particular pulp showing some early pathologic condition, and nowhere is this more true than in the different forms of pulpitis as classified by Arkövy. Again, so little case-recording has been done in a systematic way

that we are far from sure of clinical signs as yet given; certainly they do not agree with the pathologic findings.

SYMPTOMS OF PULP DISEASES.

Our text books show that a whole series of diverse diseases of the pulp produce like symptoms, and that a whole series of diverse symptoms have for their basis a like pathologic picture. The location, the physiologic disturbances and the diseases to which the pulp is subject are more destructive and far reaching than in any

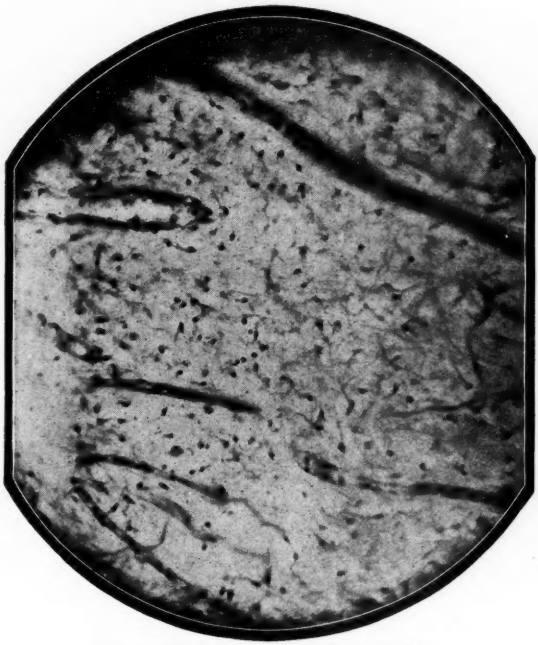

Fig. 2.—Hyperemia and early resolution.

other organ of the body where we have an outlet by the anastomoses present. The only method of relief in many cases lies in lessening the circulation through the vasomotor system and depletion through the excretory organs so often evidenced by the sudden stoppage of the pain when a patient is frightened on reaching a dentist's office.

CHANGES IN THE PULP.

In the case of the pulp we must consider the following facts: *a.* The delicate structure of the pulp is apt to undergo rapid secondary changes after an inflammatory attack, whether from a constitutional or a local cause. *b.* Its location and poor methods of egress for exudations and dangers from compression. *c.* Fissures and lesions of dentin and enamel are not always able to re-

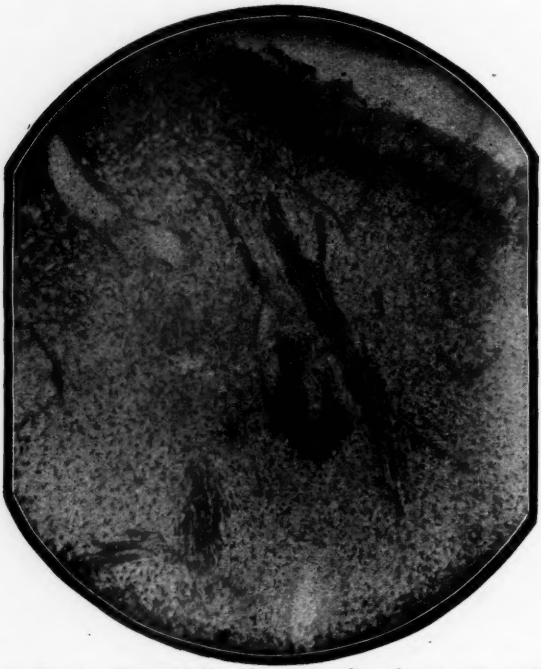

Fig. 3.—Rhexis. Extravasation from vessels; edema; cell proliferation. Early pulpitis.

cuperate for perfect repair. *d.* If a pulp has been exposed it is difficult to disinfect and hermetically seal it under artificial methods, for chemicals act differently in different teeth and individuals. *e.* The small surface, the many enemies of both a bacteriologic and anatomic nature, together with almost invisible cracks in the enamel (only seen when the teeth are dry) render the

occurrence of inflammation, even before decay has apparently reached the surface of the pulp, almost a certain occurrence. *f*. The position and relation of the pulp, for in ill-developed teeth the pulp chamber may extend by minute processes abnormally near to the surface or even to the enamel. In such teeth many interglobular spaces are usually seen in the dentin, and the ready absorption of oral fluids and growths of yeast organisms soon cause caries. This is especially the case in the temporary incisors and the first permanent molars in early childhood, also after infectious of gastrointestinal diseases followed by chemical abrasion and

Fig. 4.—Tortuous vessel of pulp, showing danger if interfered with. Edema. Cloudy swelling among the cells and badly staining reaction.

erosion and hyperemia of the pulp due to irritation of the nerve mechanism of the pulp. *g*. The question of whether lymph spaces are in the pulp or if the dentin may not act as an analogue through the tubules is still under discussion. The lymphatic supply of the jaws and teeth has not yet been determined.

PULPITIS.

Let us now review the most common disease of the organ, viz., inflammation, and follow the stages.

Definition.—The definition given by the late Sir John Burdon-Sanderson is perhaps one of the best to cover so many processes and variations in different cases. "Inflammation is the succession of changes which occur in a living tissue when it is injured, provided that the injury is not of such a degree as to destroy at once its structure and vitality." To follow the pathologic changes

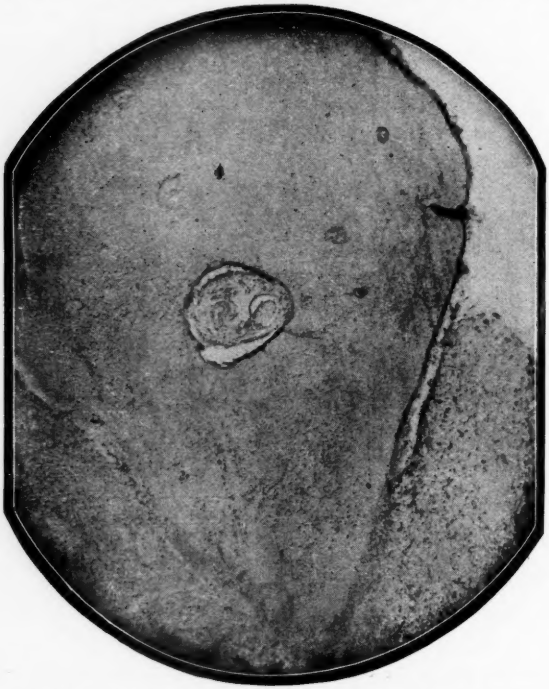

Fig. 5.—Pulp and peridental membrane, showing calcification around pulp or nerve. Note the many minute canals in same section, often a cause of repeated attacks of pain after so-called pulp extraction in pyorrheal teeth.

Podwyssozki's definition is good. "Inflammation is a local reaction of the living tissues against the irritating substance. This reaction is chiefly produced by a phagocytic activity of the mesodermic cells, and it may precipitate not only changes in the vascular system, but also the chemical action of the blood plasma and tissue fluids in liquefying and dissolving the irritant agent."

Etiology.—The causes of inflammation are usually:

A. Predisposing.

1. Deficient blood supply through walls.
   (a) bad air, (b) food,
   (c) hemorrhage, (d) anemia,
   (e) heart disease, etc.
2. Presence of impurities or poisons in the blood, as in:
   (a) chronic alcoholism, (b) Bright's disease,
   (c) diabetes, (d) gout,
   (e) syphilis, (f) lead, phosphorus and mercury poisoning.

Fig. 6.—Same as Fig. 5, but magnified to show the condition of the pulp vessels. Arteriosclerosis. Venous thrombus.

3. Deprivation of healthy nerve influence by injury of a nerve center or trunk.
4. Strumous diathesis.
5. Old age.

B. The exciting cause is always an irritant, which may be:
   (a) *traumatic,* direct violence.
   (b) *chemicals,* acids, alkalies, caustics, vesicants.
   (c) *bacterial,* fermentation, irritants, putrefactional, ptomains, leucomains.
   (d) *electric,* battery, lightning, non-insulated wires.
   (e) *thermic,* heat and cold.

Symptoms and Signs.—These may be—

1. Irritant.
2. Granulation.
3. Determination or active hyperemia.
4. Disturbance of circulation.
5. Increased motion, oscillation, retardation.
6. Stasis (partial or complete).
7. Vascular dilatation.
8. Exudation—migration, diapedesis, rhexis, etc.
9. Swellings, edema.
10. Terminations and sequeli.

Fig. 7.—Proliferation of round cells; early fibrous tissue formation; resolution of pulpitis.

(a) Resolution, absorption, or organization.
   1. Vascularization,
   2. Granulation.
   3. Scar tissue (cicatrix).

(b) Chronic inflammation or sclerosis, fibroid thickening, interstitial pulpitis, cirrhosis.
   1. Hyperplasia,
   2. New formations (neoplasm).

(c) Suppuration.
(d) Abscess, necrosis.
(e) Ulceration.
(f) Gangrene.

Chemical products of putrefaction are the chief agents in producing spreading inflammations. For fermentation or putrefaction (sepsis) there must be (a) dead animal matter, (b) some water, (c) oxygen, (d) a certain temperature, (e) presence of a ferment, which is the product of living microorganisms. Species *Schizomycetes* (bacterial) known as saprophytes.

The inflammation is caused not by the bacteria, but by the chem-

Fig. 8.—Coagulation necrosis. Areas of early suppuration. Capillary embolism.

ical products (sepsin and ptomains) which form in putrefactive processes, soak all the tissues and act like any irritant fluid or poisonous alkaloid.

The Bacteria of Inflammation.—Infective microorganisms are important in cryptogenic or so-called idiopathic inflammations. Erysipelas and some forms of periostitis, pulpitis, and periodontitis seem to depend on these germs and malignant pustule is proven to

do so. These bacteria multiply and produce irritating products called ptomains which set up inflammation. Saprophytic bacteria live only on dead animal matter and are incapable of existing in live tissues. Some species by protoplastic activity obtain food from dead organic material, multiply and cause changes in the fluids in contact with their surface, known as fermentation. To this process are due: (a) Decomposition of serum and pus in a wound; (b) conversion of milk sugar into lactic acid in souring of milk in the stomach; (c) conversion of urea into ammonium carbonate, and so formation of ammoniacal urine in the bladder, causing cystitis, etc.

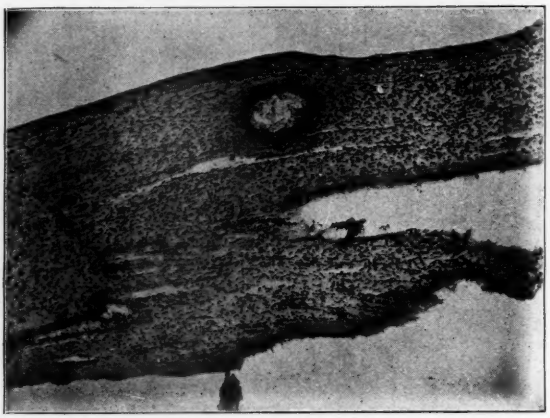

Fig. 9.—Interstitial pulpitis with pulp stone in situ.

Albumin of dead organic matter in contact with these bacteria decomposes into peptones, then into ptomains and so into alkaloids.

Mode of Entrance of Bacteria. Bacteria may effect an entrance (1) by a wound, thus producing local inflammation; (2) by lymphatics, whence they proceed to the nearest lymphatic glands, where they may be arrested; (3) by the circulation; (4) they may get into small veins and so gain the circulation at once and lodge in capillaries of the various organs; (5) from mucous membranes, as in gingivitis and diphtheria; (6) by migration from one point to another, as by extension of pulpitis gangrenosa to the submaxillary glands, as phthisis spreads from the larynx to the intestines or bronchial glands to lungs and so into the circulation. Influenza is

often a cause of otitis media, oral infection and death of a pulp; (7) diseased tissue produced by one kind of bacteria may be secondarily infected by another kind. For example, croupous pneumonia is frequently infected by the tubercle bacillus and the tuberculous tissue by the pyogenic micrococcus (mixed infection). Influenza bacilli in the blood reach the pulp and cause pulpitis, ending in gangrene and cellulitis.

PROTECTION OF TISSUES AGAINST BACTERIA.

The tissues may be protected against bacteria (1) by exhaustion of the soil or acquired immunity, as one attack usually exempts

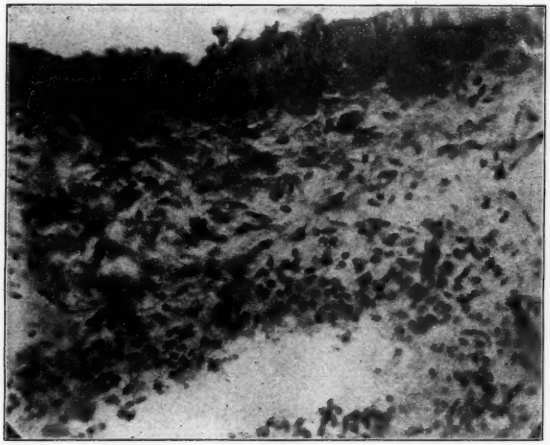

Fig. 10.—Abscess, limiting wall of round celled infiltration, or so-called pyogenic membrane ulceration. Gangrene. Odontoblastic layer.

from a second (example, variola); (2) by chemical products formed, *pari passu,* with the bacteria acting as a poison to the bacteria and preventing their development (chemotaxis). Toxins are repellant, producing a "negative chemotaxis;" (3) By tissue cells collecting around the bacteria and so killing them; (4) by phagocytosis, the cells absorbing and destroying bacteria.

Reaching the Pulp.—The irritant may reach the pulp in several ways: (1) By direct exposure as a sequel to caries, erosion, abrasion, fracture, etc. (2) Exposure of the dentinal tubules through trauma, filling, etc., and transmission by the fibrils of irritating

stimuli as acids, metal fillings too close to the pulp. (3) Through the apical foramen as sympathetic depressions which may pass from the seat of injury in one part of a nerve tract and produce symptoms at a different terminal. For example, irritation by pulp stones in the third molar may cause hyperemia of the pulp in a premolar. Pulp stones in a third or second molar may cause a neuritis in the infraorbital nerve at its foramen of such a character as almost to indicate antral involvement. (4) By contact with the periodontium, especially in connection with constitutional effects, as infec-

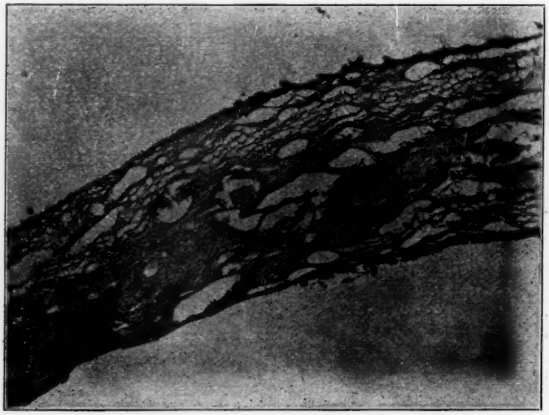

Fig. 11.—Reticular atrophy of the pulp (fibroid). Myxomatous reticulum nuclei at points of intersection and calcareous degeneration.

tious diseases, mercurialism, rheumatism, malaria and especially when much arteriosclerosis is present.

PATHOLOGY.

When any sufficient irritation is present an active hyperemia follows, partial or complete, as in one of the cornua or radicular portions or all (Fig. 1). The cause, if quickly removed, may result in the pathologic symptoms abating, the leucocytic migration stops, the cells are reabsorbed and no evidence is left. This is the so-called, but erroneous, "irritation of the pulp," for irritation is not the actual disease, but the cause. So far as caries is a cause of hyperemia we must recall that clinically we have a difference in the signs as presented by the type of cavities. There is, first, the

cavity as seen at the cervical margin, due perhaps to chemical erosion or mechanical abrasion, being sensitive to the touch, and conveying sensations, and, second, the further advanced type of caries, insensitive, which hardly, if ever, admits the slightest impulses to the pulp. If we study the tooth structure in these two classes we shall find different changes as regards the pulp tissue, the odontoblasts and the dentinal-enamel region, with a possible increase of interglobular spaces, and in the odontoblastic zone,

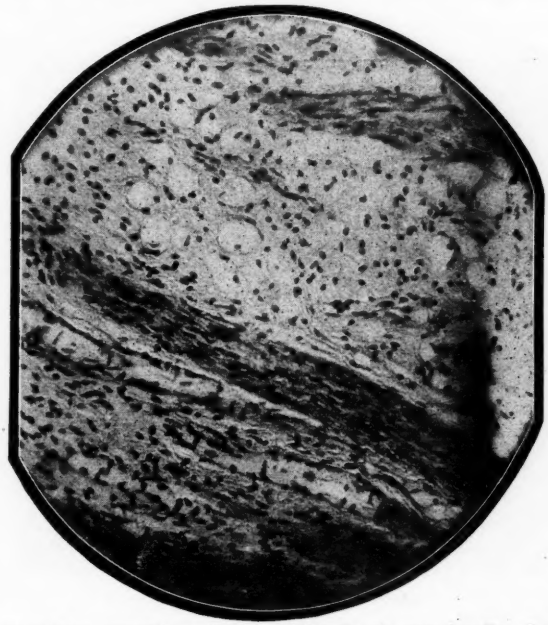

Fig. 12.—Fatty generation of pulp. Sclerosis of nerve bundle. Interstitial pulpitis.

an excess of calcoglobulin about the germinal odontoblasts, which latter are increased in number in the hyperemic area. Some cell proliferation is also present (Fig. 2), showing that Nature is trying to protect herself and to protect the pulp as long as she can, thus cutting off the trophic sensations by increasing the resistance to stimuli and filling in the cavity by new if imperfectly organized tissue. Whether the odontoblasts have more to do with the vaso-

motor system than with dentinification is as yet an open question, but clinically it would seem as if they have, or at least that they assist more materially.

Pulpitis is the common termination of hyperemia, and histologically the pulp shows very different degrees of interest. Cases should be taken from teeth, first, in which caries has not penetrated into the cavity and, second, in which there is exposure. We find in some specimens a well-marked cell infiltration, dilated vessels on account of the stasis of the circulation and evidences

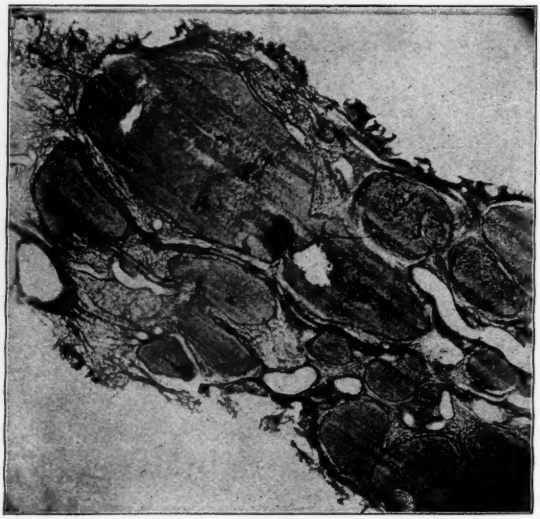

Fig. 13.—Colloid degeneration. Calcification not present of reticular or fibroid degeneration.

of edema which may be seen by the poor staining of the tissues which look water-logged (Fig. 3). This distension shows the clinical evidence of pain by pressure of the odontoblasts against the dentin and the constriction by the alveolar dental membrane through inflammation of the vasomoter nerves scattered through the pulp and constriction of the vessel walls (Fig. 4). The endothelial cells are easily lost by the dissolution of the cement substance, and with the cell changes we obtain clotting, thrombosis and

embolism (Figs. 5 and 6). This condition I have often seen in teeth extracted for interstitial gingivitis or pyorrhea.

A CASE OF PULPITIS.

Let us take for examination a tooth which has been the subject of periodontitis followed by a pulpitis and then quieted down. Note, first, the thickened membrane and that at certain places there are absorption areas or excavations with large giant cells; in another place in this root are older absorption spots and a layer of new tissue filling them up and increasing the size of the tooth (hyperce-

Fig. 14.—Cicatrix of pulp. Dense hyaline cell areas simulating granulation of epithelium.

mentosis). The pulp cavity shows that there has been a change in the layer of odontoblasts which form the attachment and act as a source of nourishment from the pulp to the dentin. It is from this layer (the connecting link between the hard calcified dentin and pulp matter) that the so-called secondary dentin is formed, but under certain circumstances the characters of the cells forming this layer change both in size and shape (Fig. 5). If we have a hyperemic condition or slight pulpitis, a great amount of blood is brought to the pulp blood vessels. These cells lose their shape, swell up,

the nuclei become active and new cells are rapidly formed by mitosis (Fig. 7). As these new cells proliferate, a thickened membrane-like layer is seen pressing on the dentin and so causing an absorption of the latter in order to gain more room for growth (Fig. 6). Just so long as we have an abnormal blood supply to the pulp, a long or short time of pressure on the hard walls, so long do we have few or many absorption areas which may be superficial or deep. If the tissue is imperfectly calcified around the pulp canal, the giant cells will more easily penetrate and pass out in all direc-

Fig. 15.—(Neoplasm.) Epithelioma of pulp.

tions continuously or intermittingly, depending on what changes are going on externally on the tooth or in its cemental layer. If extracted about this period nothing is found of the pulp or only a thickened membrane on the pulp canal walls. These changes are produced by the odontoblast layer of the canal, and if not extracted we find the pulp congested, odontoblasts altered or destroyed and no connection with the tubuli (Fig. 8). In the dentin, giant cells are becoming formative agents, building a new tissue resembling a poor type of dentin, cement or bone-like material with its lacuni

and canaliculi in the enlarged pulp, developed from a membrane very similar to that of the periodontium. These same changes may be seen in the incisors of horses, cows and dogs. The vascular system returns to the normal. Clinically the tooth is tender to percusison almost as in periodontitis; this gradually subsides until another inflammatory attack recurs, then follows interstitial periodontitis with resorption and loosening of the tooth. If this continues we may have to extract the tooth, for through this calcific

Fig. 16.—Vasomotor system, pulp, nerve degeneration slight, myelin, nodes of Ranvier.

degeneration we may have many reflex conditions as well as gingivitis, even to suppuration (Figs. 10 and 11).

In the more chronic cases we really see the influence of the defective ways of egress. Everything in the way of pathologic histology which belongs to the retrogressive disturbances of nutrition may occur, as interstitial pulpitis, suppuration, necrosis, gangrene and the various degenerations (Figs. 8 to 13). When a tissue is dead we never hear of its recovering. But just previous to death we may have a line of demarcation in the healthy tissue in the body,

as in gangrene of the extremities, but this is a rare sequel in the pulp on account of the peculiar anatomy in the radicular part of the tooth, and because its apical entrance provides no way of egress or ingress. Cases do occur in which cicatrization has been seen both in so-called healed caries and in pulps in which punctures have been made intentionally for hyperemia, or accidentally (Figs. 7 and 14). I feel that as soon as we can secure aseptic or even antiseptic cavities and tissues, especially in the dentinal tubules, and freedom

Fig. 17.—Nerve degeneration; thickened fibers. Nuclei well marked.

from enamel fissures we may expect a greater number of pulp recoveries if the patient be in good general health.

As a termination by hyperplasia from a chronic pulpitis we need only note the so-called polypus of the pulp which has been ably studied by von Römer. We all know the comparatively non-sensitive mass consisting of rather thick granular tissue in three layers, the outer having white blood or pus cells beginning to break down,

the second the capillary vessel layer and endothelial cells almost like granulation tissue, and the third connective tissue with enlarged vessels and many round cells. He especially noted an entire absence of nerves or only a few nerve fibers. In the pulp cavity itself and in the canals numerous nerve bundles were seen degenerating. Such can be best seen in pulps which have been laid bare by fracture in attempts at extraction and in which the superficial pulp is

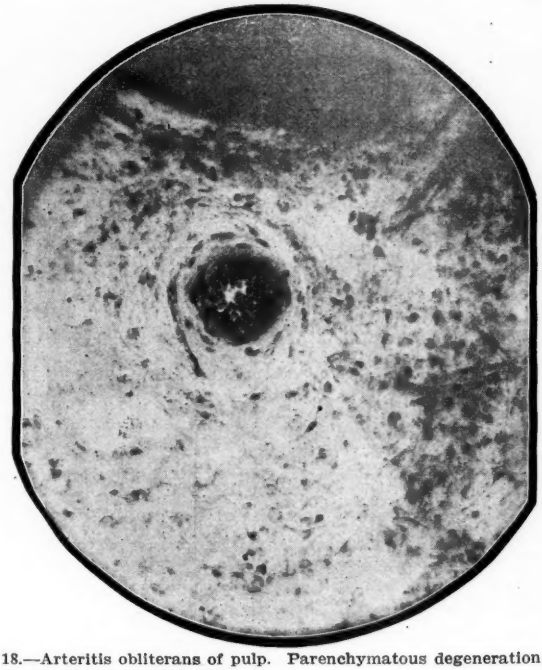

Fig. 18.—Arteritis obliterans of pulp. Parenchymatous degeneration. Thickened nerve bundles in pyorrheal tooth.

cicatrizing. The differences between pulp hypertrophy and *pulpitis chronica hypertrophica granulomatosa* as quoted by Rothmund and Arkövy may not exist, says Dr. von Römer. Certainly a growth which follows the type papilloma is usually different to the interstitial pulpitis or fibroid form by having a richer supply of blood vessels more dilated like an angioma and less fibrous tissue.

With regard to the other termination as a possible result of pulp-

itis, neoplasm or true tumor growth (Fig. 15), I refer to my paper in which the literature and work has been discussed. In order of frequency in a series of cases taken from the records of the Dental Hospital of Budapesth (Anton Kosma) it was determined that acute periostitis is rarer than any other inflammatory disease, next maxillary affections, and then acute pulpitis, then follows chronic periostitis and, as borne out by my own histologic studies, chronic inflammation of the pulp, or, as I prefer to designate it, interstitial pulpitis. A peculiar circumstance is that the frequency of all inflammatory diseases in the upper jaw increases to the first molar and from thence decreases. The same order also occurs in the lower teeth. It may be said that in the first molar there is hardly any disease that one has not the opportunity of investigating.

If the teeth are considered individually, the inflammatory conditions in the upper premolars, incisors and cuspids occur more frequently than in the corresponding lower ones. But this is not so with the molars, the inferior of which suffer more than the superior, and this corresponds with the statements of Magitot and Kay, J. Tomes, S. Cartwright and Hitchcock.

In studying pulpitis there are specimens in which the most careful work by staining for bacteria does not show them to be present in the tissue of the pulp, more especially in the chronic or interstitial forms. Sections may show the dentinal tubes carrying some, and in others the pulp and odontoblast layers show them and also degenerative changes in the cells themselves. An interesting study could be made by examining sections of the pulp, especially stained to show the probable distribution of the microorganisms, if they penetrate the basal layer of Weil and the probable routes of invasion into the pulp.

NERVE DEGENERATION.

Nerve degeneration so far has been little worked out in the pulp, but that it is present is evident. The degeneration of a severed nerve is well known in surgical practice, but it is not often remembered that simple contusion may have the same effect as severing the continuity of a nerve trunk. A contusion may abolish the function of a nerve for some hours, but if the function is not restored within a reasonably short time degeneration of the nerve may follow just as though it had been severely injured (Fig. 17). The peculiarity of nerve contusion is that it leads to neuritis and so may

give what is really a pressure paralysis owing to the histologic structure.

As we know, a nerve trunk is made up of a number of bundles of nerves, each surrounded by a connective tissue sheath. This strong fibrous sheath plays an important role in the pathologic study of neuritis. The nerve has its own lymphatic, vascular supply and a special nerve supply to give it local sensibility. A contusion may, and in some cases does, set up a secondary neuritis, congestion, cloudy swelling, edema and distension of the nerve sheath, which is an unyielding connective tissue, and if the inflammation is severe the compression of the nerve fibers gives us pressure paralysis and very soon the nerve degenerates. The symptoms may be obscured at the time of the pain and swelling. Microorganisms may follow and infect the nerve fasciculi, as they usually arrange themselves along the blood vessel walls.

Whether the odontoblasts have a phagocytic function as suggested by Arkövy is not yet proved. Figures 16 and 17, if compared, show degenerative changes in the ground work and very slight swelling at the nodes of Ranvier, some collection of the myelin substance, while Figure 12 shows a sclerosis, fatty degeneration and (Fig. 17) thickened fibers.

The loss of control of the vascular system of the pulp and obstruction in the vessels followed by inflammation are probably factors in interstitial gingivitis which may be a cause of the gingivi losing their normal function and so aiding in the progress of the disease (Fig. 17). The interference with the vascularity of the bone, the arteritis obliterans in the pulp and peridental membrane (Fig. 18) producing venous hyperemia of the gums (acute or interstitial), changes in the mucous glandular structure and functions, and, finally, atrophy and osteomalacia.

Discussion. *Dr. M. I. Schamberg,* Philadelphia. For a long time dentists have been prone to regard the pulp as merely a bundle of nerves. By the work of Dr. Latham we are compelled to believe that there are many pathologic conditions which are prevalent in other parts of the body and at the same time found to exist in the pulp. When I saw Dr. Latham's slides about a year ago I was much impressed with the fact that it would probably be best to remove all pulps which were even closely approximated by decay, if not entirely exposed. It pleased me to hear Dr. Latham give evi-

dence of the fact that some of these conditions might be alleviated or improved by the proper treatment, because the conservation of that organ prevents numerous complications which arise when we attempt to fill canals that are very minute and which are extremely important.

Dr. E. S. Talbot, Chicago. According to the essayist, it is difficult to say when a pulp is in a healthy condition, or to demonstrate a healthy pulp. It is a singular thing that in the evolution of a pulp from the lower vertebrates up to man, a general degeneration of the pulp occurs, and as we ascend from the lower vertebrates we find that the pulp gradually grows smaller and smaller, until in man the apical end of the root is almost entirely closed, so that we have a pulp mass consisting of blood vessels, nerves and connective tissue inside of the tooth. In my opinion the pulp is at its highest physical development when it commences to form dentin. The mere fact of its growing smaller and smaller at that time would lead one to believe that degeneration was going on. Why we ever have a healthy pulp is hard to understand, for Dr. Latham demonstrated almost every pathologic condition that is possible to be found in the human body.

Ten years ago Ramón y Cajal of Madrid, Spain, found a stain by which he was able to show a nerve-end degeneration, and for the last eight or ten years the members of this Section have been using it along the line of research work. I have been studying the pulp for the last ten years with Dr. Latham, and some beautiful work has been done showing nerve-end degeneration in the pulp tissue. Arteriosclerosis, as well as fatty degeneration, has been noticed. The question naturally arises, then, where so many primary diseases are found in the pulp, is it not better under most conditions to extract or to remove the pulp and to fill the root of the tooth, rather than to try to preserve it by capping?

Dr. V. A. Latham, closing discussion. One point was not made plain in regard to pain in teeth after pulp extraction. There are two photographs (Figures 5 and 6) which show the center pulp chamber being occluded by arteriosclerosis and beside that the amount of dentin forming around has practically obliterated the chamber. Six or eight exceedingly minute but distinct pulp canals are seen. This is a case in which one may extract the pulp and think the work is done, but on careful manipulation a condition will

still be found to remain, and the patient will return day after day, saying: "Doctor, that tooth still hurts."

In another case the nerve, instead of going through the central chamber, actually came through the cemental surface into the peridental membrane. On passing a probe down at the side, pain was felt which nearly made the patient jump out of the chair. After extraction the nerve was found coming out at the lingual side of the tooth, to the gingival margin. It was not a case of hypersensitive cement or dentin as diagnosticated by several. The erratic position of the pulp and its terminal fibers is a matter of considerable importance to stomatologists and physicians in the matter of reflex disturbance.

GOLD INLAYS.

BY J. W. LYONS, D.D.S., JACKSON, MICH. READ BEFORE THE MICHIGAN STATE DENTAL ASSOCIATION, AT DETROIT, JULY 10, 1906.

I wish to state at the outset, and have it thoroughly understood, that this subject of the gold inlay is not presented with the idea that it is the method or the only method by which the dental organs may be restored to usefulness for the patient. Whatever claim is advanced for the practice of using the gold inlay, I desire not to leave the impression that I would, in any way, discredit the use of the many other valuable filling materials and methods with which we are familiar at the present time.

I believe in taking the broadest view possible of all methods and ideas by which we are able to render humanity a valuable service, and stand here proud to say that I have rendered comfort and happiness to many a patient by the use of cement, amalgam, tin and guttapercha.

Hand in hand with the advent of the porcelain art in dentistry came the gold inlay as we know it to-day. The gold inlay was first introduced many years ago as a sort of cast-metal filling, but it seems not to have been successfully handled, except by a very few men of the profession, and was not very generally used. With the progression of the times the porcelain inlay has taken its present prominent place and with it, as a sort of side development, has again come the gold inlay, but with a better developed and culti-

vated knowledge for its construction and use, which will, doubtless, make it a permanent adjunct to our methods of saving teeth.

I scarcely believe that the men who occupy the ranks of the profession to-day are better men or are more conscientious in their work than were those of a generation ago, but I do believe that the profession at the present time possesses men who, through better educational advantages, thorough study and a higher development of their mental faculties, are better able to think than our predecessors.

Through concentration of thought and original research along special lines, methods and ideas have been developed, and these have resulted in bringing success out of what appeared to be failures to those of a few years ago.

Gold and porcelain inlay work are but signs of the mechanical advancement which we have been making with such rapid strides till it looks as though we are nearly at the top. It would be wrong to say that this is due solely to mechanical genius or manipulative skill, but we can truthfully say it is due to a combination of genius, skill and scientific investigation.

We must not forget that our success does not lie wholly within ourselves. There are those who have contributed materially to our welfare, not by concentrating their thought along the line of how to preserve the tooth by means of the inlay, but by designing the best and most practical instruments to assist in constructing the inlay, such efforts being seconded by the manufacturer, who so admirably and beautifully produces our fine and delicate instruments.

Still another phase of this question of our success lies in the fact that in our professional life we cannot afford to avoid coming in contact with the other fellow, to touch elbows as it were and make good use of some of his ideas. We progress by the demands made upon us. The porcelain inlay has been brought about by the demand for the more esthetic, the gold inlay by a demand for a more resistant substance to withstand the ravages of decay and to better stand the stress of mastication.

Very important, also, for both are the demands made upon the up-to-date dentist of to-day by his patient who is now awake to the fact that more painless and less enervating methods of practice are possible. This argues strongly for the inlay, because one of the

great questions before us is how to make operations easiest for our patients.

The gold inlay I believe to be indicated in any cavity where we might use porcelain, excepting those cavities in which the esthetic is of paramount importance.

It has been claimed by some that porcelain is the nearest to an ideal filling material for all classes of cavities. I must admit that for a majority of the cavities in the anterior teeth porcelain is almost ideal; for those cavities which are very conspicuous it certainly has no superior, but I must dispute its claim for superiority for large molar and many bicuspid restorations in masticating surfaces where the friability of porcelain gives us weak edges and thus necessitates its taking second place.

The porcelain and the gold inlay are reciprocally related because the study of the methods of using either one results in the development of the other, and in practice we find many things so nearly identical that to be able to successfully use the one we must know much concerning the other.

The gold inlay is indicated in many places where, otherwise, we could only use cement, owing to the frail walls where the tooth has been so wasted away by decay that there remains but little dentin underlying the thin wall of enamel. Here we are able to restore the strength of the wall very materially by building up the body of the tooth with cement, then cutting back enamel margins to where they are heavy enough to resist decay, cutting a portion of our cavity in the cement. This done we have only to construct our inlay, set, finish and burnish the borders, and the tooth is ably cared for. We have the strength of a cement filling and the durability of a gold filling. The gold inlay is suitable and much to be preferred in a great many of those cases where, formerly, we resorted to the crown. It is by far superior to the crown where we are able to use it, for the reason that we are not in any way disturbing the surrounding tissues, these being left in their normal condition.

As I said before we regard the gold inlay as the best for very large cavities in the molars and bicuspids, the occlusal surfaces, compound cavities in these teeth involving proximal or buccal surfaces and restoring cusps. The inlay is superior to the gold filling

in its wear, as it is so much harder. It will stand the stress of occlusion and mastication better, and will not mar nor scratch. Within thin walls or edges the pure gold filling is very apt to change shape under the battering of occlusion, thus causing a fracture of enamel walls and margins, whereas the inlay protects these and renders the tooth immune to such misfortune.

Do not understand me as advocating the gold inlay to the exclusion of the gold filling. Each has its particular place where we may get the desired results, but it is my belief that some gold fillings would serve the tooth far better if they were removed *en masse* and reset in cement. I have a record of such a case. A large cavity in a central had been refilled by a neighboring dentist the third time, but the leverage was so great that it had again been dislodged and patient wished me to refill. As an experiment I reset the old filling in cement. That was eight years ago and the filling is still standing as an inlay, whereas its life as a filling had only been about one year.

The gold inlay may be utilized practically in some cases of bridgework to secure attachments where abutment teeth converge, such as we often find with the bicuspid and second or third molars, where patient has lost second bicuspid or first molar or both.

In the preparation of the cavity for the gold inlay we must avoid all undercuts that would in any way distort the matrix in its removal from the cavity; also, the walls must diverge slightly from the parallel. This is not made absolutely necessary to get the closest fit as with porcelain, for there is no matrix to be stripped off from the finished inlay, but it aids removal of matrix from cavity.

Of course directly contrary to the principles of inserting the ordinary metallic fillings, the orifice of the cavity must be larger than the interior, a slight undercut being permissible at one side of the cavity if the other side is so beveled as to allow the removal of matrix without distortion.

Inexperienced inlay workers often have had too much faith in the cement, believing in its ability to hold the inlay to a saucer-shaped cavity. Our scientific cement investigators and experimenters have not as yet given us that cement with which we can stick an inlay to an almost flat surface and know it will stay.

Experience teaches that it is unnecessary to go to such extremes,

but we may easily shape our cavities with a view to obtaining as much retention as possible. Be sure always to shape cavities by different walls and angles or by varied shapes of base so that the matrix cannot be rotated in the least, but will go to its exact place every time.

All inlays should be so seated as to set on good flat bases and the cavities so constructed that pressure will rather force the inlay into the cavity instead of out.

When it comes to the construction of the inlay we must consider that nearly every skillful man has his peculiar methods of doing things, and yet will arrive at the same results, and no doubt this will be one of the most important facts brought out in the discussion of this paper.

My preference in the procuring of the matrix is by means of burnishing and swaging with unvulcanized rubber, gum camphor or sticky wax, or by use of hollow-pointed instruments in which are inserted soft rubber points.

For the matrix I use either the 1-1000 platinum, or pure gold No. 36 gauge. From the Jenkins people I learned to fold a bit of silk chiffon over each side of the matrix before burnishing into the cavity and this has assisted me greatly in preventing any puncturing of the matrix before getting to the bottom of the cavity.

Sometimes I take an impression of very large cavities, and usually use the Detroit Manufacturing Company's modeling compound. Fill the impression with cement, then by heating remove the compound; this gives a duplicate of the cavity in cement, into which the matrix is burnished and swaged approximately and then finished in the tooth. Where it is desired to build up cusps place a small amount of the compound in cavity and have patient close the teeth which gives the imprints of the opposing teeth, then remove the impression and carve the cusps. This may also be done out of the mouth where the model containing the cement cavity has been mounted on an articulator with a bite of the opposing teeth. After having cusps and proper contours carved duplicate in gold plate by first filling a rubber molding ring with soft plaster, submerging the occluding and contour surfaces in the plaster and allowing it to set; then by trimming away surplus plaster and removing compound an impression of the cusps and contour of the inlay is afforded. Now duplicate this in fusible metal by pressing

a bit of moldine into plaster impression, turning it upside down and pressing the moldine firmly upon the face of an anvil. Carefully remove the plaster impression and leave the moldine die adhering to the anvil. Surround this die with a small ring, such as supplied with the Coates swager, and pour with fusible metal, which gives a counter-die of cusp and contour surfaces of the inlay with outside measurements. By swaging in gold plate, 33 to 36 gauge, you have the cusps and contour in one piece, which is adjusted to matrix with sticky wax and a hole opened through bottom of matrix or through the contoured surface, after which the whole is invested and filled with solder. Always coat outside surfaces of matrix where you do not wish the solder to flow with whiting or anti-flux.

If the inlay is without cusps fill matrix with scraps either of 22k. gold or 22k. solder, or both. Do not melt the entire mass of solder at once or porosity is liable to result, also some claim you will get more shrinkage. My method is to melt in piece by piece. When desiring a hollow inlay I place a piece of chalk or carbon of size desired in bottom of matrix, pack fiber gold over and around it and flow solder over this; when completed cut through bottom of matrix and remove this chalk or carbon, thus leaving a hollow inlay.

I am very much like the physician who varies his medicine according to surroundings and circumstances. I hardly ever follow out the same rules or methods in every case, but vary them according to some peculiarity desired in the results.

Let me give as one important factor the necessity of having a perfect matrix. The inlay should so fit the cavity that the cement will form the merest film between inlay and tooth substance around the walls and margins. Over the base next to the pulp it is well to have more cement, as with the hollow inlay, to prevent thermal changes.

The value of the inlay as also of a filling depends upon its weakest spot, such as a poor border, poor anchorage or a misfit, just as the strength of a chain lies in its weakest link.

When you have carefully set your inlay be sure to burnish all edges carefully as this virtually seals the cement.

In summing up, let me say that we should be conservative in the use of the inlay, as well as of any other treatment, and be abso-

lutely sure, if possible, of its giving success. The indiscriminate use of any method or material, no matter how much merit it may possess, will be very liable to injure you.

Wisdom and good judgment are always brought into use in deciding what method of restoration will give the best results. In any operation it is for the operator to decide when to use the inlay and when not. If the operation is a failure it will be because the operator's judgment or skill, or both, have been found wanting.

With the gold inlay we get all that is needed to stand the stress of mastication, we get a filling for the tooth which the fluids of the mouth or substances taken into the mouth do not attack, for it is chemically indestructible.

Its thermal non-conductivity gives much comfort to the patient, and by its close adaptability to the walls and margins it is almost a perfect seal to the cavity.

Because of the ease of insertion, without the use of the rubber dam, you will be informed by your patient that there is yet hope for a dentist beyond this life.

The gold inlay affords durability, comfort and cleanliness to the patient, correct restoration of dental organs and a saving of vital energy to both patient and operator.

Discussion.—*Dr. C. H. Worboys,* Albion, Mich.: I have in mind one place where the gold inlay answers much better than a gold filling. Suppose we have a mesio-occlusal cavity in an incisor, which necessitates the cutting of a groove across the incisal edge of the tooth to serve as a retainer. By building gold into that groove and down into a pit you make a wire, as it were, to hold the filling. There is possibly no poorer metal of which to make a wire than pure gold for such a purpose, for if you had a piece of gold wire and wanted to lengthen it you would put it on an anvil and tap it a little and so increase its length. Just so with the retaining wire on the incisal edge of the tooth; the masticating impacts of the occluding teeth will stretch this foil-made retaining wire and this in turn pushes the body of the filling away from the tooth and causes a leaky filling. For such cavities the gold inlay is better, for we have a harder metal because of using fused and alloyed gold which is both harder and stronger.

Some of my methods of construction of the gold inlay are a little different from those mentioned in the paper. In making a die for

a gold inlay I take an impression of the cavity with a piece of guttapercha. Around that I place a piece of paper and pour in the low-fusing metal which gives a model of the tooth in the metal. Place this model in the crown swager on the sealing wax and burnish the gold or platinum approximately to it and then swage. Any matrix swaged over a die or form is sure to fit. After the matrix has been swaged on the model remove and try it in the tooth and burnish to place, or swage with cotton or rubber into the cavity. For large contour fillings including the restoration of a cusp with a hollow inlay for the grinding surface of a tooth, or for taking in any two sides of a tooth, my method is to take a bite in the mouth with modeling compound and then carve that to the matrix and put it in the swager, removing enough of the modeling compound to allow for the thickness of the gold. Then place this in the metal impression with the modeling compound in place and swage the cusp plate over it. Follow by fitting the cap and matrix together, of course, removing the modeling compound, and solder the edges from the inside, protecting that part where it is desired that the solder shall not flow. When making a hollow gold inlay be sure and fill it with cement that is thick enough to be packed in.

Dr. W. H. Jackson, Lansing, Mich.: In reference to gold inlays, there are certain conditions to be considered before adopting them. There are conditions in which you cannot put in a metal filling or even a porcelain inlay and preserve the life of the tooth. Many teeth are in such a condition that despite being filled the enamel will break away in the course of a month or two. It is in such cases that the best interests of your patient are conserved by the use of the gold inlay, because this will preserve the pulp. If you cut off a tooth and put on a jacket or porcelain crown, you have approached the pulp nearer than should have been done in such a case; the gold set or inlay is far superior to anything else that might be used in such cases. I have used them all the way from 1882 up to the present time, and have records on my books showing that some of them have been in for twelve and fifteen years.

If not properly made the gold inlay is not as good as a gold crown. None of the cement should get to the surface so that the oral secretions can act upon it. You have to have pure gold in the matrix and drive it down perfectly true, and before the cement

is set burnish all edges so that no cement is exposed. The result will not be a success until these points are observed. If the secretions get to the cement it will dissolve out just as readily as from a porcelain inlay. I have twelve in one mouth, which I showed here last year, and all are still intact and as perfect as the day they were inserted.

With inlays on grinding surfaces you have to use great care, because if you leave too long a lapping edge in a short time that edge of gold is worn away thus leaving the cement exposed, and resulting in its dissolution. A gold inlay, in order to be perfect, must come so near to the edge that it will stand almost perpendicularly; then it will not wear away and expose the cement.

Dr. Land, Detroit: In having gold flow over a platinum matrix successfully I invariably paint the surface with precipitated gold, when I can flow any karat of gold on it and bring it up to any form of contour desired. When pure or original gold is painted over the surface, it having a higher fusing point, the solder will flow to every point and cover it perfectly. All inlay methods originally called for a metal matrix that was swaged with soft metal dies and such can be made without puncturing, regardless of the depth.

Dr. Lyons, closing discussion: The first thing that is due our patients is to give them the best service and most comfort that is possible, regardless of whether it is by means of a gold filling or porcelain inlay. For the posterior teeth we are able to produce a piece of work by means of the gold inlay that absolutely fits the cavity, where there is no stripping of a matrix and you do not have the thickness of the matrix metal to take into account. If we extend the gold matrix we are enabled to burnish the edges and can effectually seal the cavity.

In regard to one point brought out by Dr. Worboys, that of getting the cusps, my experiences have caused me to differ from his method. In swaging the cusps by means of procuring the counter-die in the fusible metal it is unnecessary to take into account the thickness of the gold, because I have the outside measurement. In making that die the thickness of the gold is taken into consideration and we get the counter-die outside measurement instead of inside measurement.

REPORT OF TWO CASES OF INFANTILE SCURVY.

BY ALICE M. STEEVES, D.D.S., BOSTON, MASS. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, AT BOSTON, 1906, AND PUBLISHED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

The history of scurvy dates back to 1589, when its most dreaded presence was among sailors and in the armies, where a plentiful supply of fresh meat, vegetables and water was unavoidably limited and often absent altogether. Much suffering and not infrequently death have resulted from this disease, which has been classed by prominent writers among the diseases of the blood and nutrition.

Scurvy, scorbutus, or Barlow's disease, so called because of the concise and efficient article published by Barlow of London about twenty-five years ago, and elaborated on in later years by Comby of Paris, is not confined to adults, and is equally serious when appearing in infancy or childhood.

Bacteriologic causes have not been satisfactorily proven, and while it seems not unreasonable to believe that further investigation will throw some light on this side of the subject, and although the disease is declared uncommon by modern writers, yet it seems possible that in orphan asylums and institutions where children are overcrowded and underfed many cases might be found if proper medical inspection were instituted.

A few years ago, a child of four years of age was referred to my clinic from a large orphan asylum near by. On examination I found a well-developed case of scurvy. I prescribed treatment and ordered that the patient report to me at stated intervals. After waiting several days for the patient to appear, I called at the institution and found that the child was benefitted by the treatment prescribed, and the matron told me the cases did not usually get so bad as in this instance. I concluded, therefore, that these cases are not rare in such institutions. On examining the mouths of 180 girls at the Lancaster Industrial School, I found 20 per cent. with thickened spongy gums, saliva purulent and mucoid and with the mucous membrane of the nose, mouth and throat inflamed. These patients invariably complained of rheumatic pains, and while the condition is not strictly scorbutic it seems to suggest a field for investigation.

General Symptoms.—Infantile scurvy may appear at any age, but usually about the ninth month a child, anemic, poorly nourished, and living in improperly ventilated rooms, becomes weak and irritable. At the same time the muscles gradually become soft, the face becomes pale and assumes a scared expression; the skin is tense, shining, and seems edematous, but does not pit on pressure. The limbs become sore and the child screams if touched. The legs are flexed at first and later are extended. Swelling appears on the shafts of long bones, on the femur first and on the upper end of the tibia; later it may appear on any of the long or flat bones. The lesions are not always symmetrical and may go on to separation of diaphysis of the femur or upper end of the tibia. The eyes are more or less affected; ecchymosis appears in spots on different parts of the body. The lesions of the gums are more marked when teeth are present; the gums become swollen and purple and bleed easily. The mouth is filled with a fetid sanious exudate. Digestive disturbances are vomiting and diarrhea. The internal organs affected are spleen and kidneys.

Complication. Infantile scurvy is not infrequently complicated with acute pulmonary diseases and in such cases there is a rise in temperature, accompanied by respiratory and cardiac disturbances.

Treatment.—This consists of regulation of diet. Milk, beef juice, fruit juice (preferably orange or lemon) and tonics must be given as the case demands. Plenty of fresh air, water and cleanliness are essential.

Prognosis. Under favorable conditions a gradual recovery may be expected. When complicated with acute pulmonary diseases the case may terminate fatally in a very short time. Scurvy is frequently a complication of rickets.

Pathology.—Pathologic findings reported by different writers are extravasion of blood beneath the periostum, separation of the epiphysis of the femur, subperiosteal, medullary, and muscular hemorrhages, and a diminution of red corpuscles with their hemoglobin. No changes in the leucocytes are reported so far as I can find.

CASE I.—Mary B., aged 7 months, was brought to the dispensary.

Examination.—She had anemia, with swelling of the face and legs. The skin was shiny and tense; the parts did not pit on press-

ure. The legs were extended, with the toes turned outward. There was ecchymosis over the right eye and some spots on the upper part of the body. The gums were swollen and purple, and the mouth was filled with a fetid exudate. She cried with pain when touched and seemed in constant dread of being handled.

History.—The child's mother had nursed her for two months and all seemed to go well; but the mother was obliged to work and the child was then fed on Nestles' food after the beginning of the third month, when it gradually lost strength and suffered from indigestion and loss of appetite, followed by the above described condition.

Treatment.—The patient's mother was instructed to give the child a warm bath and then to wrap her in flannel. The child's mouth was irrigated with a solution of water Oi, glycerin ℥i, lemon juice ℥ss, while castor oil, ℥i, was given to clean out the alimentary canal. Modified milk, beef juice, and orange juice were ordered.

Result.—The child's mouth cleaned up and she began to retain food, but pneumonia developed and she died in forty-eight hours.

CASE 2.—Alfred G., aged 4 years, was brought to my office.

Examination.—He was nervous and afraid of being touched; he cried when looked at; his attendant gave a typical history of scurvy. The child's gums were purple, mouth filled with fetid sanious discharge, and face anemic and shiny. The femur was so sore that the child moaned at each step. The joints were swollen, purpura was absent.

Treatment.—I ordered milk with lime water, beef juice, orange juice and lemonade. Castor oil, ℥ii, was given to clean out the bowels. The mouth was irrigated with water Oi, glycerin ℥i, lemon juice ℥ss. Treatment was changed as the child improved; he made a slow recovery.

There has been much writing on scurvy, as may be found by referring to the "Index Medicus." The principal authorities consulted in this article were Barlow, Comby, Baginsky, Rotch, Jacobi and Keating.

DISCUSSION.—*Dr. M. L. Rhein,* New York. Dr. Steeves has very properly drawn the attention of the profession to the possibility of much of this condition of infantile scurvy being prevalent in juvenile institutions, and to the great likelihood of its undermining the future strength of the child. The diagnosis of infantile scurvy is

of comparatively recent date and should not be confounded with general scurvy, the latter being a disease that has been recognized for a long time. Infantile scurvy is a disease with which every practitioner should be thoroughly familiar. The essayist did not draw attention strongly enough to the fact that the main point in treatment of infantile scorbutus is that the diet should be radically changed; the disease has been caused by improper nutrition, and while the acids are eminently necessary, the main feature is absolute change in the form of diet.

INTROSPECTION AND RETROSPECTION.

BY C. A. PEAKE.

I have a blizzard of eight years ago to thank for the most valuable lesson I ever learned.

Yet the blizzard only indirectly—a magnificent old Scotch-Canadian directly.

"But from all evil some good we may take," and if that blizzard had not imprisoned a number of us in the city, away from our suburban homes, I would not have had the lesson.

For hours, a couple of thousand nervous men paced wearily up and down the big waiting rooms of the terminal depot, or gathered in groups and discussed the situation, or asked questions of railway employes.

No trains were running and there was no telling when any would.

At last four of us decided to go to a hotel, and went, after telegraphing our families.

Ferguson—the Scotch-Canadian and an ironmaster; Milwell, a lawyer; Beale, a manufacturer, and myself.

We could get but one room, and that on the top floor, and a pile of snow had drifted in through a ventilator. However, it was shelter, and there were two big beds and plenty of covers. After some dinner and a smoke we went to the room. We drew lots for bed partners, and Ferguson and I were paired off.

We said our prayers and tumbled in. Now that discomfort was over, we were inclined to have some fun. Ferguson, however, was silent, which was strange, for he was a mighty companionable old chap; but we could not make him talk for a long time. The rest

of us chaffed, told stories and laughed, but Ferguson remained silent. That he was not asleep I discovered when I pulled the covers off him and got a jab and a kick at the same time.

At last he talked and what he said was worth listening to.

He told us that he had been doing something his mother taught him up in the wilds of Canada, nearly fifty years before. "Introspection and Retrospection," he called it. Every night, he said, during all those years he had done it, and this is how:

Lie with eyes closed, and mentally review the day. Things done and not done, and why. Personal behavior; treatment of others; maintenance of self-respect.

At first, he said, it was hard to remember much that had happened, and still harder next morning to apply the decisions and resolves made.

But sticking to it made it easy, and now every event of the past day marched in orderly procession before him when he willed, and he awoke each morning armed and outfitted for that day.

He told us that it had become his habit to defer overnight, whenever possible, his decision on important questions.

Away from the man with an alluring proposition or an engaging manner, he could decide things on their merits. And few things looked the same.

He never changed his night-time decisions—said that where he was wrong once he was right a hundred times and was satisfied with that proportion.

Told us, too, of instances where he had reversed daytime decisions at night—and profited by so doing.

But what he had to say about personal behavior, treatment of others, and maintenance of self-respect, was most interesting.

If he had smoked a cigar too many; if he had been hateful in manner; if he had displeased himself in any way.

If he had been any less a man than he felt he ought to be—and his standards were high.

There was shame and reproach; intent to stand straighter and effort to stand straighter.

He held that confessing a fault was simply common honesty, and that an apology, if it was due, should be made as sincerely and unaffectedly as a little courtesy to one's family.

More things he told us—but you, doubtless, catch the drift.

And now for my own experience with "Introspection and Retrospection."

I was self-assertive and positive; what I said and did was right because I said and did it—in my opinion. That is, before I tried the plan.

I thought I was rather a big man in achievement and position; this, also, before I tried the plan.

I had an idea that the world was especially made to be my habitation, and that pretty much everybody else was trespassing on my property. Have you ever felt like that?

Politeness, while never essential, was all right with my friends and those from whom I wanted favors, but with those who were subordinate or who wanted favors from me it was not to be expected.

It was awful—the first night. I laid awake a long time.

And I did not get anywhere near the business end of things.

My confounded meanness—that I had felt to be virtue—loomed up too big.

Next day I nearly took a man off his feet by saying "Good morning"—I had previously grunted at him.

I apologized to another for some nastiness of the day before, and he immediately inquired about my health.

I kept on, night after night—and made amends, morning after morning.

Making amends was tough work for awhile—but about the time I got sort of used to it I did not have much of it to do.

Yet it was never half as tough as the arraignment of self by self—the baring of my soul to my soul in the still watches of the night.

I grew decenter and decenter—had to, to find any comfort in living.

I made fewer business mistakes.

I have kept it up—every night; no matter how tired I am, I spend a quarter or half hour in reviewing the day and planning for the morrow.

I am glad I learned—so will you be, if you try it.

Why shouldn't we all be pleasant to do business with, whether employer or employe?

Why shouldn't we make the most of ourselves?

Why shouldn't we understand that in respecting the rights of others we are firmly establishing our own rights?

Why shouldn't we be men—big, broad, kindly, thinking men?

The world needs each of us as that kind of a man—and Introspection and Retrospection will do much toward making each of us that kind of a man.

OCCLUSION IN BRIDGEWORK.—It is often found in placing a bridge on the lower jaw that the upper teeth have elongated, due to lack of occlusion, and it is necessary to grind a great deal from the upper teeth in order to secure proper occlusion. For this it is not necessary to destroy the pulp. If at the first sitting the dentin becomes sensitive, apply nitrate of silver; at a subsequent sitting grind some more, and you will finally remove all the black stain from the silver nitrate.—M. C. CARPENTER, *Western Dental Journal.*

DISINFECTION OF THE MOUTH. BY DR. MONTEFUSCO. [*La Estomatologia*, Madrid, April, 1906.]—Dr. Montefusco has carried on a series of investigations in view of determining a practical method of mouth disinfection. He first brushed his teeth, then rinsed his mouth thoroughly with distilled water in order to remove all particles of food. Immediately afterward he again rinsed his mouth with 20 cc. of sterilized water, which was subsequently used to prepare a number of Koch plates. No growth of colonies developed in these plates. The first brushing and rinsing was then omitted, and with the water of the second rinsing a number of plates were again prepared. In the latter each cubic centimeter contained from 435 to 641 colonies. Omitting the first thorough brushing and rinsing, the tissues of the mouth were again brought into contact with 20 cc. of distilled water. After the rinsing, the quantity of water was diluted with an equal volume of a solution containing fresh oil of peppermint 1 cc.; alcohol 10 cc., and distilled water 1000 cc. A number of plates were then inoculated with the following results: Number of colonies obtained from water expelled from the mouth after rinsing and undiluted with antiseptic solution, 544; after two minutes' contact with antiseptic solution, 286; after five minutes, 182; after ten minutes, 95, and after fifteen minutes, 82. Boric acid, potassium chlorate, and sodium benzoate diminished but slightly the number of colonies.

From his long series of experiments Montefusco has concluded that the most satisfactory method of disinfecting the mouth consists in rinsing it, and then brushing the teeth with sterilized brush and water during fifteen minutes. According to this investigator the aromatic essences have practically no germicidal effect upon certain pathogenic bacteria, such as the bacilli of typhoid and cholera; their action being only slightly more effective upon the bacillus diptheriæ and the diplococcus pneumoniæ.—*Dental Cosmos.*

Digests.

CONSIDERATION OF EVIDENCE IN SCIENTIFIC INVESTIGATION. By G. V. Black, M.D., D.D.S., Sc.D., LL.D., Chicago, Ill. It is very difficult indeed to define what should be regarded as conclusive evidence in the formation of concepts of the results of scientific work. Every subject-matter submitted to investigation in the past seems to have had set for it certain lines of evidence independently of general observations on other subjects, and to get a full view of what has been considered conclusive evidence upon which men have formed concepts reducible to practice, would require a very extensive examination of the history of the development of the sciences. In any event, the final decision is left to the body of men interested in the particular class of investigation.

In such a review, one finds that the rules of procedure necessary to the establishment of concepts reducible to practice and regarded as right differ continually as the years go by, and then concepts that have served long in practice and are believed to be correct are broken and displaced by the discovery of new truth. The science of the first decade of the nineteenth century was not the science of the third decade and the science of the fifth again was different from the third, and so on to the end of the century. There is perhaps as much difference in the evidence required by men as to facts in science, particularly new facts, as there is in their conceptions of the formulation of the science under which they work. Even the arithmetic of my boyhood has been almost completely changed in its forms, and in many instances in the characters used, although this is one of the most permanent of the sciences. Chemistry has changed its formulary, though the facts in chemistry are not different from the facts in my boyhood.

As it has been with these, the more permanent of the sciences, it has been with others of this class; but what shall we say of those that have been developed, indeed have sprung into existence—in this time!

Perhaps there is no better field in which to study the extreme exactions of men as to the evidence required to change their conception of the basic facts in science than the study of bacteriology. This

may be said to have begun with the publication of Schwann in 1838. This was in its beginning an investigation of the fermentations and putrefactions. Up to the time of Schwann, the best concept of what we now know as fermentations and putrefactions was that expressed more fully a little later by Justus Liebig in papers published in 1840-42. He states his concept as follows:

"Fermentation is the result of the catalytic action of a decomposing body in contact with compounds of feeble molecular affinity, which is brought about in accordance with the following law of dynamics: A molecule set in motion by any power can impart its own motion to another molecule with which it may be in contact."

He argued that yeast is a product of the decomposition of gluten, and is necessarily a decomposing body whose molecules are in a state of molecular motion, and which when added to must or wort, sets up in these bodies a molecular motion of their molecules similar to its own, by which its saccharin elements are converted into the simpler and more stable compounds, carbonic acid and alcohol. This may be said to be the simplest and most comprehensive definition of the concept of scientific men of the fermentative process up to that time. It was generally conceded that oxygen was necessary to this process and had the power to set it in motion, for it had been found that substances exposed to heat and sealed up while hot would not undergo putrefaction or fermentative decomposition. Schwann, in his microscopic studies of the alcoholic fermentative processes, had found them continually accompanied by globules, which he termed the yeast plant. These globules grew and multiplied by a process of budding which he could see and follow in his microscopic examinations. He claimed also that no production of alcohol occurred without the growth of these globules.

The evidence which he presented of this was that fermentable solutions that were boiled to destroy all life existing in them did not decompose when sealed; also that air might be admitted freely to such solutions through red-hot tubes, or through tubes with bulbs so arranged that the air would have to pass through sulfuric acid, and no decomposition would occur. In this way he admitted oxygen freely without inducing fermentation or other form of decomposition, but the addition of the yeast globules would set up fermentation at once.

Liebig in his papers to the British Association for the Advancement of Science, in 1840-42, made the claim that Schwann's proof was no proof at all of the vitality of yeast, for by the use of sulfuric acid through which he passed the air, or by the use of red-hot tubes, he would destroy the decomposing particles which might pass with the atmosphere; or that the decomposing body might be a gaseous body, the action of which would be destroyed in the same way as the particles of decomposing matter. It was well known at that time that the heat of boiling water destroyed ferments. Furthermore, the oxygen itself might be so changed in these ways as not to have its ordinary action on fermentable solutions. Now here is a case in which Schwann had seemed to have presented uncontrovertible evidence of the truth of the concept which he proclaimed. Liebig's argument completely destroyed the whole fabric of Schwann's concept so carefully worked out.

From this time on, the battle between the vitalists on the one side, and the chemists on the other, over the processes of putrefaction and fermentation went on steadily.

In the meantime Pasteur, of France, sprang into prominence in these matters because of the success he had achieved in the study of the disease of the silk worms of France, which was threatening to destroy the silk culture of that country. In this study he discovered that the disease was caused by a small germ or mold which grew in the worms, produced by the contamination of the eggs laid by the moth. By giving directions, which were very simple, for the prevention of this contamination, he saved the silk industry of France, and was immediately put in a position in which he could study such subjects to the best advantage that the science of the time would allow. He immediately undertook the study of the fermentations. By his wonderful system of fractional cultures he determined that none of the fermentations could occur without the presence of living plants, and that each was produced by a particular species of plant that was different from those producing other fermentations. But again, it was quickly shown that Pasteur's fractional cultures were always produced by transferring some portions of a previous decomposing body to his solutions, and that he did not succeed in protecting his solutions from possible contamination with decomposing bodies and molecular motions described by the chemists. It was still held that the microorganisms seen were

mere accompaniments of these processes, and in no way their cause.

A point of signal importance was scored by Schroeder in 1854, when instead of sealing his solutions, as had been the habit of investigators before him, he simply stopped an ordinary test tube with sterilized cotton and demonstrated that such a stopping, which would allow air to pass freely but would filter out all particles of solid matter, was equal to hermetical sealing in its power to prevent decomposition occurring in fermentable or decomposable solutions. This at once destroyed Liebig's idea of the action of oxygen and of a gaseous agent of decomposition, but it did not destroy his idea of solid, dry particles floating in the air and being able to renew their molecular motions and set up processes of fermentation upon again being moistened.

Though two of the concepts of the chemists had been demolished, the contention went on. In was in vain that the vitalists demonstrated the presence of organic germs in each of the fermentations and decompositions, or that they demonstrated that each would fail unless it had growing within it the particular form of germ that they had found to produce that particular fermentation or decomposition. Still the old idea of molecular motion accompanying them was a bar to any general reception of their ideas by the educated public mind.

At this time a new interest was injected into the study, and its direction changed into medical lines by which might be called a happy accident. In 1865 Mr. Lister, a surgeon of Glasgow, became interested in following the contention between the vitalists on the one hand and the chemists on the other. At that time, the fact that the large hospitals had become places of danger rather than of safety to surgical patients had given the idea to our best medical men that either living germs or the molecular motion decompositions might be responsible for the infection of wounds causing the evil results, and were seeking some remedy that would make the large hospitals safer for operative wounds. It had also been found that there were in the pus from wounds of surgical patients similar, if not identical, microorganisms with some of those of the decomposition. It was these considerations that impelled Mr. Lister to make the following remarkable experiment for a number of patients, one after another, for whom he was making deliberate surgical operations.

He prepared by the most thorough cleansing of his own hands and instruments, also the skin of the patient in the region to be operated upon, and then attempted to purify the atmosphere in which he operated by a spray of carbolic acid, which was then known to be destructive to the agents of fermentation or putrefaction; afterward, he so sealed the wound with sterilized cotton and bandages as to prevent the ingress of particulate substances. To his own surprise, and to the astonishment of the medical profession, no suppuration occurred in any of these wounds, but each healed by first intention the same as subcutaneous wounds.

The plans adopted by Mr. Lister in this treatment of wounds were so simple that surgeons everywhere tried them at once, and the results reported were so generally confirmed that they were immediately accepted as expressing a truth of vast importance to man. This gave a tremendous impulse to the study of these subjects, and swerved many men of science, whether justified or not, from the opinions of the chemists to the opinions of the vitalists. But the evidence was not sufficient in the opinion of the mass of scientific men to establish the facts claimed. True, suppuration could be prevented by the methods of Lister, which were rapidly simplified, but still the molecular hypothesis held firmly to its ground; it had not been destroyed—and again there were long years of labor with indifferent results. Even such men as Thiersch and Billroth, while accepting the methods of Lister and obtaining similar results, still claimed that they found these so-called microorganisms in the blood of healthy persons, and that it was not the effect of these growths, but the effect of decomposing bodies, that was shut out.

Again there was a long series of experiments by the vitalists for further results that could be regarded as more conclusive. This time Dr. Koch was the lucky man. He developed the process of selection staining by analin dyes, by which microorganisms in the tissues could be stained while the tissues remained clear. As this was tried and found decisive in its results, it was proved by this means that the granules in the blood of healthy persons regarded as microorganisms by Thiersch, Billroth and others, were not microorganisms, and established the fact that it was only occasionally that microorganisms were found in the blood of healthy men. This was followed quickly by the

discovery, again by Dr. Koch, of the processes of cultivation upon semi-solid media, in which every movement of the microorganisms could be watched during their growth; a plan by which these could be studied without inciting fermentation or decomposition in the substratum on which they grew. By these methods individual species of microorganisms could be certainly separated from other species and watched from generation to generation as they were transferred from culture to culture, without any of the usual signs of decomposition accompanying them.

These growths were small, but when the microorganisms thus grown were again transferred to fermentable solutions the decomposition appropriate to each microorganism followed with certainty. This, as it was put into practice by many men, furnished practically the necessary proof of the influence of microorganisms in the fermentations and putrefactions, and finally gave the last test necessary to prove their connection with the production of disease. This was not completed until between the years 1880 and 1884, and even at that time was held in doubt by very many scientific men.

The doctrine of evolution has been particularly beset with denials and difficulties of proof. There are in our own professional lines of work many cases of a lesser sort, but of the same nature so far as requirements of evidence are concerned. Miller's work on caries of the teeth was very slowly received. The benefits of the use of the rubber dam introduced by Barnum were very slow of realization. On the other hand there are many concepts springing up that seem incapable of bearing fruit because of lack of merit.

Undoubtedly many of the concepts of phenomena proposed by zealous experimenters should pass into oblivion because derived from false premises, or by reason of their unfitness. Some years ago Dr. Arthur, in the study of injuries of the teeth by dental caries, proposed and developed what became known as the Arthur method of separating teeth in the treatment of approximal surfaces. Many men tried this method, found it wanting, and it quietly passed into oblivion. It is practically buried in the books and journals of the past. This was not because it did not have in it some valuable truth, but because it was not fitted for the permanent exemplification of that truth. The craze caused by the concept cataphoresis, as a pain obtunder, will be remembered, and how it passed, leaving the manufacturers with whole rooms full of junk. This was not be-

cause this concept did not contain elements of truth—*i. e.*, cocain can be carried into dentin, not otherwise injectible, by the electric current—but because its rightful instrumental application was found too difficult for the masses of men. It was unfit.

In all of this consideration there should be a careful distinction between a concept derived from the study of associated natural phenomena and a mere mechanical device. We have so much to do with that which is purely mechanical that we are liable to confuse the two. In fact, the usefulness of an apparently valuable concept may depend upon an instrumental appliance, and become unfit because of imperfect instrumentation.

Under the influence of Dr. Carl Heitzman a new proposition—or an old proposition under a new form—was sprung which practically denied the cell theory, and with this were proposed new theories as to the structure of the human teeth, the inflammatory theory of dental caries, and more of the same order. This flourished for a time among those more closely identified with this man and his immediate circle of friends, filling books and journals with much matter, and influencing the minds of quite a large number of practitioners. This has passed as a hypothesis unproved and unfit to explain the phenomenon it endeavored to elucidate.

The concept that some teeth are soft or poorly calcified, while others are hard and contain a greater proportion of calcium salts or are well calcified, grew up in the dental profession through the observation that the teeth of some persons decay very rapidly, while the teeth of others decay very slowly, or not at all. This became the settled conviction of nearly all men, not only in the dental profession, but of the laity as well. This is now being replaced by a concept that is different, and undoubtedly better fitted for the welfare of the communities which we serve. Thus far this has stood the test of criticism. But the change of sentiment is not easily made. Many good men are very slow to give up a concept which they have held from their boyhood.

Not many years ago the "new departure" sprung into prominence. It had for its object the displacement of gold and the substituting of amalgam (plastics) for filling teeth. It proceeded on the hypothesis that in proportion as teeth need saving, gold is the worst material with which to fill them. Nowadays we do not hear of that, though hundreds of men in the dental profession were in-

fluenced by that claim to do things which they would not repeat now, because they have learned that it is not good for the people whom they serve.

What shall we say of that oft-discussed subject, the amalgam controversy? In the past amalgam was certainly the most hated material ever used by dentists, yet its use has grown until it has become almost universal in dentistry. I have been personally responsible for the most recent studies of the properties of this material, and found a basis, before unknown, by which it can be rendered far more useful. There is no way by which the dentist can tell the good from the bad for himself except by close observation of years of trial, and men can impose upon him alloys unfit for use. The habit manufacturers have of holding formulæ and plans of making alloys secret has become a bar to progress. Indeed, they are making their alloys virtually secret remedies. The physician will not prescribe a proprietary drug until he has been furnished its ingredients and mode of preparation. Should the dentist be less exacting? Certainly he should know as thoroughly what he uses in the mouth in the treatment of caries of the teeth as does the physician who prescribes drugs know their formuli. It is the business of the manufacturer to furnish that which the dentist needs in the forms for his use, and when this is demanded by any considerable portion of the dental profession it can be obtained and will be furnished cheerfully.

It seems to me that it is the duty of men of scientific turn to test such a case to the fullest necessary extent, and to provide some public means by which a dentist may know whether or not the alloy he uses is so made as to produce the best results obtainable. There is no necessity for any unreasonable demands. Whenever alloy-makers know that their alloys will certainly be subjected to definite tests that are reasonable, a sufficient number will furnish alloys that will stand that test. There is no good reason why the dentist should use an alloy that will fall short of the full usefulness demanded of it.

There are always with us a number of concepts or propositions that should be looked upon as on trial. One that has been prominent for a time is the use of porcelain for inlays. The use of porcelain in dentistry has had a very novel history. It has seemed to me that more men have gone crazy—speaking somewhat figu-

ratively—on the subject of porcelain than on any other. Men have made all-porcelain plates, and have combined porcelain with other materials in the strangest of ways, most of which have passed. But recently, with the development of the electric apparatus for its baking, porcelain has again come to the front, and its most zealous advocates are promising almost everything for porcelain, though it must as yet be considered as simply on trial. In certain selected places in crown and bridge work it has certainly found a lasting place in dentistry; but for the most part, and particularly for filling teeth, the saying should be, "It is as yet on trial."

Then there is somnoform. This is a proprietary mixture for anesthetic purposes that is being pushed for gain, and many of our younger men are taking up this in the place of the long-tried nitrous oxid. Most careful men who made experiments dropped these drugs and they did not come into general use. Many will remember the A. C. E. mixture—alcohol, chloroform and ether. For a time this was popular, but the final consensus of opinion was that such a mixture was no safer than its most dangerous ingredient, and it went out of use. In my opinion, somnoform must do the same. I want to say to young men who are using it, that if they are so unfortunate as to have an accident they are liable to find scant sympathy before a court. The body of medical men have not yet recognized this as a suitable anesthetic.

In closing, what is the duty of the general profession toward new things that are presented? We are professional men. Within our field of service we are the guardians of the interests and the well-being of the communities that we serve. Is it not our duty to inquire into new things or concepts that may be presented and make such exactions as to the proof of their correctness as shall leave no reasonable doubt before recommending them? In some lines this is being well done, but is it not true that many things are being recommended for use with scant evidence of their correctness? At the same time we should not judge too severely those who run after this or that novelty, for by their endeavors the facts will be developed, and the usefulness or non-usefulness of such novelties will be made known. It becomes the duty of members of our profession to examine carefully all such things and not pass them by with indifference, for if they prove good they should

be developed. In the meantime great precaution should be taken as to risks of injury to patients in the trial of new things.—*Dental Cosmos.*

THE ANTRUM OF HIGHMORE. By G. S. L'Estrange, F. R. C. S., Ireland. The antrum of Highmore is a triangular pyramidal cavity lying under the surface of the cheek and forming what is popularly known as the "cheek-bone." Its apex lies in the zygomatic process, its base being formed by the lateral nasal wall; the orbital plate of the superior maxilla, the facial wall, and the posterior surface of the superior maxilla form its three sides.

Of these surfaces, two are important from a surgical point of view, the base or nasal surface as containing the "ostium maxillare," or natural opening of communication between the nose and the cavity of the antrum, and also as being the site of Mikulicz's operation, and partly of the radical operation of Desault Kuster.

The "ostium maxillare," or natural opening of the antrum, is a small round aperture, lying in the middle meatus, under the middle turbinal, and situated about equidistant from its anterior and posterior ends. It is, on an average, about 3½ mm. in diameter, and serves as an inlet for air in the normal state, and an outlet for fluids such as pus in disease. There may be an additional abnormal opening, the "ostium maxillare accessorium," found by Zuckerlandl to exist in about 10 per cent. of all cases. The capacity of the antrum is approximately averaged as 20 cc., or a little over half an ounce.

Of the various accessory sinuses of the nose, the antrum of Highmore is most frequently found affected, and for several reasons. On account of its position and structure it is most liable to injury, as it is more exposed than any of the other sinuses, except the frontal, which, having thicker walls, is better protected. It is susceptible to transmitted inflammations of dental origin. Its orifice of communication, the ostium, is occluded wherever the middle turbinal is in a state of congestion, and because the position of its opening is at the top of the cavity, the antrum in the erect posture holds fluids like a cup. In only one position can the antrum be emptied of its contents (and then only if the natural ostium or the accessory ostium be large), and that is when the head is lowered and tilted toward the sound side.

The antrum is liable to injury primarily on two of its sides—the facial and the orbital; but the latter is very rare. The facial wall, however, is frequently broken through by violence, such as the kick of a horse, thus causing the hollow cheek with scarring so frequently noticed in children and adults. If immediately brought under treatment, this may be successfully dealt with by opening up through the cheek over the alveolar process, raising the depressed edges, and packing with iodoform gauze.

The functions of the antrum are threefold: to add resonance to the voice; to assist in warming and moistening the air entering the lungs, and to add lightness and strength to the bones of the skull.

The antrum may present many peculiarities of shape, development and structure. It may be very large on one side and very small or even absent on the other, its size depending on the amount of osseous development taking place, as it may contain pockets or cells, intrinsic or ecstatic, similar in some instances to the ethmoid cell which is sometimes found lying in the anterior end of the middle turbinal bone, and which at first sight can be distinguished from an abnormally large ethmoidal bulla with difficulty. These cells or pockets may infringe on the orbit, the zygomatic process, the palate-bone, and even the hard palate itself. Their surgical significance is twofold: they cause unequal results in transillumination, and they render a thorough curetting away of diseased mucous membrane very difficult in the radical operation. As a further peculiarity there may be a complete septum dividing the cavity into two parts, one of which may have no opening communicating with the nose. This septum must be taken carefully into account, as, when one side may contain pus, the other—the healthy side—may be the only part opened in probe puncture.

Empyema is a purulent discharge from the cavity, which discharge may be the result of true inflammation or transmitted inflammation, either of which may be classed as acute or chronic. As true inflammations are classed those caused by coryza, influenza, erysipelas, croupous pneumonia, enteric fever, scarlatina, measles, diphtheria, smallpox, etc. *Post-mortem* examination shows that all these affections cause sinus suppuration under certain conditions; it is particularly noticeable the frequency with which sinus empyema is found in tuberculous subjects. Frankel

and Wertheim have, in a large number of autopsies, found it present in 33 per cent. of patients dying of tubercle, but in no case was the pus tubercular, nor was there primary tubercle of the structures surrounding the antrum. Their conclusion is that the condition is due to a lessened power of resistance. Coryza is undoubtedly the commonest cause of antral empyema, but of the cause of coryza itself we are as ignorant as our great-great-grandfathers. One man catches cold from sitting in a draught, another from being in a heated room. Moreover, the drover who camps out in rain, snow and wind, catches a severe cold the first night he sleeps in a room. True inflammations may succeed extensive use of the galvano cautery, or of powerful caustics on the middle turbinal, also the nasal tamponade to lessen hemorrhage, and to act as a germ protector after intranasal operations. A raised temperature with consequent empyema may result from operation on the middle turbinal, though a common result is an acute otitis.

Under the head of transmitted inflammations come empyemas of dental origin and those which result from trauma of the superior maxilla, from tumors, syphilis and tubercle.

Of these five causes by far the most common is the first. An examination of the floor of the antrum in nearly every case will show the roots of the teeth, in outline, projecting into the cavity, forming with the floor of the antrum a series of elevations or undulations. The layer of bone forming the covering of these eminences is very thin, especially in the case of the first molar and second bicuspid. In exceptional cases, the lateral incisor and the wisdom tooth may have an intimate relationship to the cavity, but they are distinctly abnormal in such relationship, and, in order to be absolutely sure of entering the antrum, one must open over the second bicuspid or first molar.

An abscess or a well-marked periostitis is frequently found at the root of a carious tooth. Such an abscess has only a thin layer of bone, separating it from the antral cavity, and can easily penetrate this dividing layer. The anatomy of the part shows that no amount of care can easily prevent such an occurrence, nor can one estimate its probability, except in so far as a high or low palate gives some index as to the size of the antrum, and its relation to the roots of the teeth. A very low palate, with deeply set

teeth and small bony development of the skull, would lead one to conclude that the separating layer and bone were less than normal, while a high arched palate, with small molar eminences, strongly developed jaw, and large firm teeth, would suggest that the floor of the antrum participated in the general bone density, and that the sockets of the teeth in the alveolus were also dense and massive.

Careless extraction may cause infection of the antrum by producing a fracture of the floor, and the most careful and expert operator, owing to natural and unavoidable causes, may find himself possessing a patient suffering from antritis consequent on tooth extraction.

A lady came to me recently complaining of post-nasal catarrh, with large post ends to the inferior turbinals. These were removed with the snare, and her condition was, under treatment, gradually improving, when she returned one day and said that four days previously she had had the first molar extracted for severe toothache. The day following she had suffered from a severe headache, and the next day she noticed a bad smell with discharge from the nostril on the side from which the tooth had been extracted, with some pain in the cheek and a great tenderness in the alveolar region. Examination showed tenderness all round the antrum on pressure, and the middle meatus of the nose filled with pus. A sound passed easily through the molar socket into the antrum. This opening I enlarged, washing out offensive pus. After eight days' syringing all discharge ceased. I have seen in the last week a similar case with even better results; the suppuration ceasing in five days through frequent washing out.

Tumors of the antrum may be sarcoma or epithelioma, and give a very unfavorable prognosis. They may be diagnosed in an early stage by the presence of a fetid watery discharge issuing from the middle meatus.

Syphilis of the antrum is always of the tertiary variety, and is generally the result of infection from unsterilized instruments. For all known cases, separate instruments are used. For any doubtful case it is wise to use an instrument set apart for the purpose.

Tubercle of the antrum is so rare as not to need any further notice.

As the duration of an empyema is dependent solely on the

amount of change which takes place in the mucous membrane lining the antrum, it is well to describe its structure. It consists of three layers, a superficial delicate connective tissue covered with ciliated epithelium; a middle glandular layer, in which the glands lie in patches or islands; and a glandless or periosteal layer, containing spindle cells. The importance of these layers is understood when one remembers that in all chronic empyemas there is great destructive change in them and that there is, in addition, a free proliferation of unhealthy granular connective tissue amounting in cases to true polypus formation, which must be thoroughly removed before suppuration ceases. This degeneration affects all three layers, even the inner or periosteal one. Such rare affections as mucous cysts, hydro-, antri-, and osteo-phites need not be mentioned.

Symptoms are classed as subjective and objective.

Subjective Pain.—Pain under the molar process and above the alveolus is found in most cases, and in every case at some stage. In two classes of cases it is invariable and persistent; in acute empyema of dental origin, with extensive periostitis of the alveolar process and the superior maxilla; and in the acute suppurations one finds in the track of an influenza or erysipelas. In the erysipelatous variety especially there is a feeling of severe tension and swelling, increased by pressure on the cheek with the finger. In all acute forms, pain in the infraorbital nerve is common; in chronic cases, the pain is more of the type of a general neuralgia. Pain in the orbit is frequent, with increased lachrymation amounting almost to a marked papillitis, but oftener causing what is described by the patient as a weak eye. Headache is usually unilateral and frontal, but may be, in exceptional cases, vertical. It is of the morning variety, decreasing in intensity toward mid-day, as opposed to the headaches of migraine, eye-strain, and the pressure of spur, venal incapacity, etc. Neuralgia is constant in all morbid affections of the antrum, and one must suspect strongly an empyema in cases of morning headache and fifth nerve neuralgia with a weak eye.

Purulent discharge is to be observed in all marked cases, issuing from the nose, and increased or lessened by posture. Many patients, by tilting the head to the opposite side and lowering it, and repeatedly blowing the nose, can produce in the very early

stage of antritis, a profuse, watery, greenish discharge, to the amount of the full antral capacity. These patients usually find antral inconvenience after a heavy coryza or attack of influenza. They are fortunate in possessing large ostia maxillare, thus preventing their sinusitis developing into an empyema. If the feeling of tension becomes marked, one can assist them by giving cocain and adrenalin spray, by the use of which the potency of the opening is increased, and complete evacuation assisted. But it must be carefully noted that in many antral empyemas no pus can be observed in the middle meatus or elsewhere in the nasal cavity, nor does the patient give a history of purulent discharge. Some empyemas discharge a very small amount of pus daily, quite out of proportion to the amount of mucoid degeneration going on.

Cacosmia may be observed, or anosmia. As a point of diagnosis, it is notable that out of the five sets of nasal accessory sinuses, an empyema causes an unpleasant smell in only two, namely, the antral and the sphenoidal. Much more frequently is the complaint made of a chronic cold in the head. Perverted sense of smell is common, but by no means invariable.

Objective Symptoms. The objective symptoms are "pus in the middle meatus," by anterior and posterior rhinoscopy, and "Fränkel's sign." Pus in the middle meatus may be due either to antral, frontal or anterior ethmoidal suppuration. A differential diagnosis can easily be established, by passing a cannula into the frontal sinus, and washing it out, or by washing out the antrum with a cannula. If these two sets are normal, the anterior ethmoidal cells are affected. In typical cases there is a turgid swelling of the middle turbinal, with a streak of pus lying between its anterior end and the swollen hyperemic mucosa of the lateral wall, and muciform process. In most cases the ethmoidal bulla will be obliterated from sight. The swelling may cause the appearance of a bilobular anterior end to the middle turbinal, with the streak of pus lying between the lobules. Fränkel's sign consists in cleaning the pus away from the middle meatus, then lowering and tilting the head to the opposite side. If empyema is present, pus will flow from the ostium, and cover the middle turbinal anew. Hayck, of Vienna, has improved on this. He first cocainises the middle meatus and turbinal, thus making the orifice of the antrum very much more patent.

Often, however, a general hyperemia is the only abnormality visible on inspection. I have observed many cases where nothing more could be noted, and empyema was suspected only from the patient's statements as to pain, headache, and lachrymation. In this case further evidence is necessary, and this is afforded by "transillumination," "probe puncture," and, in some cases, washing out through the natural opening. The last-named is theoretically the ideal method. It consists in the use of a small Hartman's cannula, with rubber tube and syringe. After cocainising the middle meatus, the cannula is introduced under the middle turbinal into the ostium. The antrum is then thoroughly washed out, and the washings examined for pus. For this purpose, a black vulcanite basin is necessary, in order to show up traces of pus, if present. Washing out through the natural opening, however, is not always practicable. A very narrow olfactory fissure, or a turbinal which has little curve, but lies flat against the lateral wall, will make the introduction of the cannula impossible, unless the middle turbinal, or part of it, has been previously removed. This is not justifiable while we have at our disposal two other methods, both easy of performance. Transillumination, or Heryng's method of diagnosis, is a pretty and fairly reliable mode of diagnosis, and the result may be relied on as accurate in about 80 per cent. of all cases examined. A small electric lamp, constructed specially for the purpose, with cable attached, is introduced into the mouth, the surroundings being, of course, perfectly dark, as in a photographer's room. If empyema be present, a dark side to the face will be noticed, and absence of the "lachrymal tache," i. e., a small semilune of transparency visible on the sound side, just under the lower eye-lashes. Transillumination as a success, however, is controlled by several important factors, and is only absolute under perfectly normal conditions. The presence or absence of antral septa, thickness or thinness of either side of the facial bones, polypi, deviation of the nasal walls, scarring of the facial integuments—all these are to be considered as influencing the result. Hayck states that several times he has found nothing abnormal in an antrum, after transillumination had shown it as markedly dark, and that, further, he has observed several cases which gave complete equal transparency, in spite of the existence of a marked muco-purulent catarrh. Wertheim also states that

a negative result would have repeatedly left him in error, as was subsequently proved. Lichtwitz has shown that, even after removal of all pus and repeated washings out, the affected side remains dark. He concludes that transparency of an antrum depends not on the presence or absence of pus or muco-purulent discharge, but on the amount of change that has taken place in the muco-periosteal lining. It must be noted that, after operation on an antrum and subsequent healing, transparency as a test for pus is unreliable for a very long time, until the lining of the cavity has become normal. Unequivocal proof of suppuration can be easily afforded by probe puncture. A hollow Lichtwitz needle (straight) is introduced into the previously well-cocainised inferior meatus, and, in an inward and upward direction, is passed through the thin lateral nasal wall. Air must be syringed through first, in order to make sure that the correct position has been attained. If pus is present, it is freely washed out through the natural opening. This is absolutely diagnostic and unequivocal. Probe puncture may also be done with a curved needle in the middle meatus, or, rather, over the inferior turbinal; but in this place it is neither so safe nor so easy. The danger in both cases is that of injuring the contents of the orbit.

A fine drill, followed by a fine cannula, might be inserted into a tooth-socket, and through into the antrum; but this as a means of diagnosis has fallen into disuse, while the old method of pushing a large trocar and cannula in through the canine fossa has deservedly been abandoned.

Having proved the presence of pus, it remains to choose a method of dealing with it, and this choice is controlled by two factors: the presence or absence of teeth on the affected side, and the probable duration of the empyema. In acute affections, daily washing out will cure; but where chronic changes with polyps formation have taken place in the mucous lining, a much more radical procedure becomes necessary. Three methods are open; Cooper's operation of boring through a tooth-socket; Mikulicz's method of opening through the inferior meatus; and the opening of the facial wall of the antrum above the alveolar process.

Cooper's method is very old, dating back to 1670, and, taken all round, is the one still in general use. After making an opening of about one centimeter in diameter vertically upward through a

tooth-socket and washing out, the cavity is packed with iodoform gauze, which is on the following day removed, and a solid vulcanite plug fitted to the opening, with a flange sufficiently large to prevent it slipping up into the antrum. This plug is removed each time before the antrum is washed out.

Mikulicz's operation provides for drainage and washing out through an opening made in the inferior meatus, with a large Krausis trocar and cannula. It is especially suitable for those cases where a sound set of upper teeth bars the extraction of one for boring upward, as in Cooper's operation. To perform Mikulicz's operation successfully, it is usually well to remove the anterior end of the inferior turbinal. The opening is kept from closing by the frequent passage of a curved vulcanite cannula.

The third method of making an opening in the lower part of the facial wall, above the alveolus, is one which I always avoid, and for two reasons: the wearing in that place of a plug or stilette is very uncomfortable; and if the gauze plug is used, the opening closes sooner than it is intended.

The foregoing methods may be insufficient, owing to chronic alteration and degeneration of the mucous lining of the antrum, in which case a more radical procedure is demanded. This is provided by the Decault Kuster operation. The posterior nares on the affected side having been plugged from behind, the cheek is held aside with retractors, the mucous membrane on the facial wall of the antrum above the bicuspids is incised, and raised with an elevator. The facial wall is then removed with a hammer and small chisel for an extent sufficient to allow of full observation of the interior, and of the full curetting away of all abnormal mucous membrane and polypi, special care being taken to curette thoroughly into any small pocket or cell which may exist. The antrum having been thoroughly cleaned, the bony wall separating the antrum from the inferior nasal meatus is then re-removed with a small chisel, care being taken not to injure the nasal mucosa, a flap of which about 1½ by 1 centimeter is cut door-fashion or wing-shaped and reflected into the antrum, in order to spread and provide a new healthy mucous lining. The cavity is then tightly plugged with iodoform gauze, and the cheek wound completely closed by sutures. The gauze is removed through the intranasal

opening, on the second day, and, as a rule, cure is quick and certain. Sometimes it is necessary to wash out for a few days.

For washing out the antrum, whether in acute or in chronic conditions, it is never advisable to use other than sterilized water. Many and different kinds of antiseptic solutions are advised, but are all inferior to sterilized water. A recent case serves to illustrate this. A patient came to me saying he had been informed by his medical attendant that all means of cure having failed, he must go into a hospital for the radical operation. On my advice he used sterilized water before determining on an operation. In ten days all discharge had ceased, to his great delight.—*Australian Journal of Dentistry.* (*American Dental Journal.*)

THE INFLUENCE OF ADENOID HYPERTROPHY ON OCCLUSION OF THE TEETH. By W. O. Talbott, D.D.S., New Orleans, La. When the third or pharyngeal tonsil becomes sufficiently enlarged, through chronic inflammation, to obstruct normal breathing through the nose, mouth-breathing is enforced and malocclusion of the teeth results therefrom.

There are a number of pathological conditions arising in the tissue surrounding the nasal passage which may result in a complete closure of one or both nares, and so interfere with the respiratory function of the nose. Among these conditions may be mentioned hypertrophy of the inferior turbinal bodies, enchondrosis, exostosis, deflection of the septum, polypi and granulations, paralysis of the alae nasi, foreign bodies, and hypertrophy of the lymphoid tissue (or third tonsil) in the vault of the pharynx.

Whatever may be the cause of the nasal obstruction, resulting in mouth-breathing, the evil results which follow will be proportioned to the age at which mouth-breathing began and the time it continues. Most of the nasal obstructions may be operative at any time in childhood, or youth, and some in adult life; but owing to the life history of the pharyngeal tonsil, which should atrophy at puberty, its affection must necessarily be a child disease. It is operative during the period of greatest development and therefore causes the greatest amount of harm.

The age at which mouth-breathing can affect the development of the maxilla most is during the period of formation and eruption of the teeth, including the temporary as well as the perma-

nent set. It is therefore operative from birth up to fifteen years of age.

Authorities on the subject classify adenoids as the most common cause of mouth-breathing, and as constituting by far the larger per cent of all affections requiring the treatment of the rhinologist. The only data giving the proportion of cases of malocclusion, due to mouth-breathing, compared with the whole number of cases of malocclusion, is that given by Dr. Angle in his work on "Malocclusion of the Teeth." In one thousand cases, 124 or 12 4-10 per cent are classified as belonging to what he terms Class II, Division I, which is characterized by distal occlusion of the lower molars, protruding upper incisors, and usually mouth-breathing.

The external symptoms of continued mouth-breathing during the developmental period are the thin, short, round end nose, short upper lip, thinness of face, protruding and elongated upper incisors that are always showing and often reach over the lower lip. The chin is usually short, and though the symptoms may be strong, there is a weakness to the appearance of the whole face. An examination of the inside of the mouth reveals a narrow upper arch, often with the bicuspids displaced lingually, or the cuspids labially. There is usually a deep and narrow vault. Though the arch is narrowed, the upper teeth do not incline lingually, which shows there is insufficient development of the superior maxilla laterally. The lower arch is also narrowed, the molars often tipping lingually, and the incisors are elongated. There is a distal occlusion of the lower molars with relation to the upper on one or both sides. The teeth are more subject to disease, particularly so the anterior teeth of adults of this class affected with Rigg's disease.

The modus operandi by which the inflamed tonsils produce malocclusion of the teeth is perhaps the most interesting part of this subject, because it is the least understood and it is a subject about which authors differ widely.

A normal child is born with his mouth closed. He breathes through his nose and sleeps with the muscles of the mouth and the face in repose. In such repose the lips are closed, and the tongue, around which the tissues of the mouth have been molded, fills the mouth and holds the upper and the lower jaws—which are

still forming—in their proper relations. There is no vacuum in the mouth to produce a suction by which the mouth is kept closed, nor is there tension on the masseter and the temporal muscles to keep it closed. It is true that later in life there is a space between the tongue and the hard and soft palate when the tissues are in repose, but this is a normal developmental condition due to the muscular pressure of the tongue in swallowing. From the date of the existence of this space, when the head is erect, the normal uvula, in repose, hangs from the rear of the soft palate without touching the tongue, ready to assist in closing the pharynx. This leaves the space between the tongue and the palate in direct communication with the pharynx, and its atmosphere of the same density as that in the sinuses communicating with the nose. This space is left to be made a vacuum at will by closing the pharynx and inhaling. Upon the child's ability to produce this vacuum will depend his success in taking nourishment by sucking. This is what permits us to drink from a glass. Holding this vacuum for one minute becomes exceedingly painful. That the muscles controlling the lower jaw are not on tension when the mouth is closed at rest is proved by the fact that opening the mouth is a voluntary act under normal conditions, likewise the movement of the lips is voluntary.

Hereditary influences would shape the jaws of a child like those of a human rather than like some other animal. It also shapes the crowns of the teeth, places them in their order in the jaws, and fixes the date of their eruption. But the tongue guides the upper and the lower teeth in eruption and supports the contour of the arch from within. The muscles of the lips and the cheeks guide the upper and the lower teeth in eruption and support them from without. When the teeth have erupted into their normal cusp locking, the inclined planes of the cusps aid greatly in directing the normal closure of the jaw in mastication, which is necessary to its normal development. When the nose is closed so as to prevent the passage of a sufficient quantity of air to supply the body, the system demands more oxygen and the person voluntarily opens the mouth to supply the lungs with air. In opening the mouth the lower jaw is depressed and drawn back by the contraction of the mylohyoid, the geniohyoid, the anterior belly of the digastric, and the platysma-myoides muscles. The

masseter, the temporal and internal pterygoid buccinator and orbicularis oris muscles are stretched by this movement of the jaw and are constantly held in this elongated position. So long as the mouth is held open these muscles are on tension. Owing to the shape of the lower jaw and the location of its condyle with reference to the occlusal plane of the teeth, when the mouth is opened, the anterior teeth are moved further apart than the molars, and so the muscles about the corners of the mouth are put on greater tension than those near the angle of the jaw. The buccal inclination of the cuspids and the bicuspids is greater than that of the molars and therefore the inward pressure on the cuspids and the bicuspids is greater than on the molars. This can be easily demonstrated by placing a narrow piece of cardboard between the upper gums and the cheeks and opening the mouth, when the pressure at the cuspids will be much more perceptible than at the molars. The stylo-maxillary ligament, which is attached to the styloid process of the temporal bone and to the distal surface of the angle of the maxilla, in performing its normal function serves as a check rein to limit the forward extension of the jaw, and by its elasticity, to return the jaw to its normal position when extended. Owing to the triangle formed by the two points of attachment of this ligament with the condyle of the jaw, when the jaw is depressed in opening the mouth normally, the two points of attachment of this ligament are brought closer together and the fibers of the ligament are relaxed. Continued relaxation causes its fibers to become adjusted to the new condition and to develop according to the space it occupies and the work done. The ligament is permanently shorter than normal and acts as a barrier to any future forward development of the jaw. The muscles adapt themselves to the new conditions, and the jaws are prevented from developing normally by the abnormal muscular tension, lack of exercise and normal cusp locking of the teeth.

When the mouth is opened, the tongue is withdrawn from its normal position in contact with the upper jaw and the teeth. The upper arch now has no support on the lingual side, while the pressure is increased from without. This withdrawal of the support of the tongue from the upper arch is the most important factor in the development of V-shaped or narrow arches.

The mouth being constantly kept open, with no occlusal sup-

port for the teeth, the upper teeth erupt into a lower occlusal plane and the lower teeth likewise into a higher occlusal plane. While there is a short upper lip and abnormal lip function in these cases this supraocclusion of all the teeth, to some extent, accounts for the inability of the person to keep the anterior teeth covered by the lips. This elongation of all the upper teeth, carrying the alveolar process with it, causes an increase in the height of the vault. These high vaults are often erroneously ascribed to the great pressure of a current of air, exhaled from the lungs in the process of breathing, striking against the roof of the mouth. The absurdity of this contention is clearly proved by recalling a principle in pneumatics, that when a given volume of air is forced through tubes of different sizes in the same time, the pressure exerted is inversely proportional to the size of the tubes; hence, if the pressure of the exhaled air, on the roof of the mouth, would raise the vault, the same air when passed through the nose would exert enough pressure to produce a nose out of all proportion to the rest of the face.

It is a reflection upon the learning of the medical and the dental professions, and upon the intelligence of civilized parentage, that children should be so neglected as to allow a pathological condition to remain unattended through the child's development, that so affects the growth of mind and body and leaves its mark on a deformed face and jaws as does the growth of adenoids.

The general practitioner often treats a child for many of his ills, prescribes a diet, gives a tonic to improve the blood, and perhaps suggests a change of climate, while the child still carries the adenoids and has the habit of breathing through the mouth.

The dentist treats and fills the teeth of children and often saves the temporary teeth until time for the permanent ones to erupt. As the upper incisors are erupted, protruding and perhaps overlapped, the mother inquires the cause, and asks if something can be done to make the teeth come straight. The dentist looks wise and remarks that the teeth are too large for the jaw or that the trouble is due to mouth-breathing, without calling the mother's attention to the pathological conditions present, and referring her to the rhinologist for treatment. The former practice in these cases was to extract the temporary cuspids to make room for the incisors, and a few years later when there was no room for the

cuspids to extract the first bicuspids to make room. Fortunately for the public, the dental profession is learning rapidly to avoid the reckless use of forceps on temporary as well as on permanent teeth. The opportunity of the dentist to observe nasal obstruction, by careful attention to the occlusion of the teeth, is greater than that of any other profession, except that of the general practitioner of medicine.

Owing to the present status of the science of medicine and dentistry, when no man can know and do the best in everything, the duty of the dentist in these cases is clear—that is to refer the patients to competent rhinologists, and if the dentist is not competent to handle the malocclusion, he should refer the patient to a competent orthodontist for such treatment as may be required.

At present a large per cent of the cases of adenoids treated by the rhinologist are discharged without any reference being made to the necessity of correcting the malocclusion of the teeth that also exists.

The orthodontist is often called upon to treat cases of malocclusion of the teeth due to adenoids. Owing to his special study of the etiology of the different forms of malocclusion, he is more likely to recognize the effects of the adenoid than the dentist, and when its presence is even suspected it is his duty to have an examination made of the nasopharynx, and if surgical interference is necessary the operation should be done before the orthodontist begins his work.—*Dentist's Magazine.*

SOME OF THE PHENOMENA OF COLORS IN PORCELAIN INLAY WORK. By J. Q. Byram, D.D.S., Indianapolis, Ind. Light has been defined as that form of radiant energy that acts on the retina and renders visible the objects from which it comes. Every object seems visible either because it gives out light of itself (is self-luminous), or because it reflects light from its surface (is illuminated). The light of the sun or the flame of a lamp are examples of self-luminous bodies, which emit luminous rays in all directions. Light emitted from the sun is said to be white light, while that from artificial sources is said to be colored light.

Color is a sensation produced in a variety of ways, but preeminently by the action of light on the retina. The specific effect

produced depends upon the character and combination of rays that reach the retina. The relation of color to light is much the same as that of music to sound. It is not the mere sound that gives to us so much pleasure, but when it is developed into its highest form, music, we are pleased beyond measure. And so it is with light. When we think of the varied ways it combines and of the pleasure that these combinations afford, we can hardly help viewing the many color harmonies of nature with wonder and satisfaction.

RELATION OF PIGMENTS TO LIGHT.

Some of the phenomena of light which assist in producing colors from pigments are absorption, transmission and reflection. If a transparent body absorbs certain colored rays and transmits others, it will appear colored from the combination of the transmitted rays. A translucent body transmits, reflects and absorbs rays, and its color is determined by the different quality of light reflected or transmitted. If light penetrates a short distance into a body and is then reflected, its surface generally appears to have the colors of the reflected rays. Light is not transmitted by opaque substances, but the rays are either reflected or absorbed. When light is incident upon an opaque body, it is wholly excluded from the other side, being absorbed by or reflected from the surface.

While all pigments have the power to reflect or transmit light, it is their power to absorb certain rays that assists in producing color. This is commonly spoken of as selective absorption, and the colors of stained glass, porcelain, etc., are examples of this phenomenon. Red pigments reflect or transmit red, yellow and orange rays, and absorb violet, blue and green rays. Yellow pigments transmit or reflect red, orange, yellow and green rays and absorb blue and violet; while blue pigments transmit or reflect green, blue and violet rays, and the remaining rays—red, orange and yellow—are absorbed by them.

When red, orange, yellow, green, blue and violet rays are combined in proper proportions white light is formed, while black results from the mixture of red, orange, yellow, green, blue and violet pigments mixed in proper proportions. The first phenomenon is caused by the combining of colored light by a process of

addition of rays, and the second is a result of adding pigments and subtracting light, for all the rays transmitted are absorbed or quenched by another pigment.

QUALITIES OF COLORS.

Colors have three principal qualities, known as hue, purity and luminosity. These are generally spoken of as constants. The excessive predominance of one color over another yields the *hue* to that color, and the greater this predominance the stronger will be the hue, *e. g.*, when blue and yellow are mixed green is produced. If yellow predominates the result is green with a yellowish hue; but if blue predominates the green will have a bluish hue.

The *purity* of a color is its lack of mixture of white or black, or of any of the colors. These not only weaken the color, but change its character. This can be shown by adding white porcelain to yellow. The yellow is not only diluted, but tends to take a hue.

The *luminosity* of a color is measured by the amount of light reflected to the eye, and is therefore independent of hue or purity. The most luminous color is yellow, while the least luminous is violet, and between these extremes are all the intermediate degrees of brightness. In those teeth where light yellow and blue predominate they appear more translucent, because they reflect and transmit the rays; while in those teeth where gray and brown predominate they have somewhat of a dull appearance, because their power of reflection and transmission of light is not so great, for more of the rays are absorbed on the surface.

COLORS CONCERNED IN INLAY WORK.

The pigments most commonly used in the manufacture of dental porcelain are precipitated gold, platinum, purple of Cassius, the oxids of gold, titanium, manganese, cobalt, iron, uranium and silver. The colors produced by the use of these pigments in varying proportions are red, yellow, blue, green, brown and gray.

Red is not used extensively by inlay workers. All gum enamel frits are tints of red. It may be added to brown to increase its luminosity. Its tints should be used to build that portion of inlays on the labial or buccal surfaces which extends rootward beyond the gingival line.

Yellow is the most luminous of the colors, and is the one used most by the porcelain inlay worker. It should be used to form the

body of most inlays to replace the dentin. It adds brilliancy to the browns or grays when added to them. Yellows of a greenish hue tend to lose their luminosity in yellow light, while yellows of a reddish hue are most luminous. Two yellows in their deeper tones may match each other perfectly, but when diluted to give lighter tints they may differ quite widely; one may be of a greenish hue, while the other may tend toward a red.

Blue is used to build the body for the incisal or occlusal portion of the inlays for those teeth with blue incisal edges or cusps. It may be added to grays with a bluish hue to intensify them. There is a variation in tone from blues with a greenish hue to those with a reddish hue. Blues with a greenish hue are more luminous and appear to be more translucent.

Green is seldom used alone, but it may be added to yellow to give it a greenish hue, or to blue to increase its translucency.

Browns should be used to build the gingival portion of some inlays, and also for the body of the inlays for discolored teeth with a brownish hue.

Grays are principally used to build the middle and incisal or occlusal portion of those teeth with a grayish hue. They are also used to sadden yellows and blues.

The intensity of a color is conditioned by the intensity of the pigments and the thickness of its layers. Two or more shades of a color can be made of the same porcelain by varying the thickness of the body. Knowledge of this fact is important in the application of porcelain in layers; for, after porcelain has been applied and fused, it is often found that the color is changed. The trouble may arise from this: The layer of enamel is so thin that it is highly translucent and the underlying layers are readily reflected through it.

"MATCHING" COLORS AND THE SHADOW PROBLEM.

One of the phases of inlay work which will always be perplexing is the difficulty in obtaining colors that accurately match the natural teeth. When we consider that teeth are composed of both organic and inorganic materials with a variation of their density, and that they are colored with pigments peculiar to them, we can readily understand how difficult it is to match tooth-structure with

a substance inorganic in its composition, differing in density and colored with different pigments.

The variation of colors so often noticeable when an inlay is cemented into its place is also quite perplexing. The inlay may be a good match when the incidence of light is at such an angle as will permit its transmission. But when the angle of incidence is changed, some portion of the inlay may appear of a different color.

The cement is the chief factor of the color problem in this phenomenon. If it were transparent it would not prevent the passage of the light through the tooth. If light penetrates a short distance into a body and is then reflected, the surface generally appears to have the color of the reflected rays. But since light is not transmitted by an opaque substance, the rays are either reflected or absorbed. Whenever light is incident upon an inlay it is excluded from the dentin on account of the layer of cement, which forms an opaque body, and the color of that portion of the tooth and inlay which is in contact with the cement may differ from the other parts because of the unequal absorption and reflection of the rays.

The question of the color of cement to use for setting inlays has been considerably discussed. When inlays are constructed of a monochromatic porcelain and are slightly lighter than the tooth, a cement which is of the same color as the porcelain, but of a lighter hue, is the best for setting them, for the rays that are transmitted through the porcelain are not absorbed by the cement, but reflected to the surface with practically no change of color other than intensifying it. I have contended for some time that a pure white cement would be the best for setting all simple approximal and approximo-incisal inlays constructed of multi-colored porcelain, because white bodies do not absorb light, but reflect it. The same rays that are transmitted to the cement would then be reflected to the surface, for white has a greater reflective power than any color. Unfortunately, the manufacturers are unable to produce a pure white cement, and therefore we cannot entirely overcome the change of color caused by the cement's dimly reflecting and partially absorbing the transmitted rays, when the incidence of light is at such an angle that the unabsorbed rays cannot be transmitted through the porcelain.

Another difficult problem is the formation of a shadow. When the light is incident on the teeth or lips it is partially excluded from all or a portion of inlays in some locations, and this causes the inlay to appear much darker. This fact should be recognized when selecting colors for an inlay. The color of the tooth should be studied with the incidence of light at different angles and with the lips partially covering the tooth. In selecting colors for inlays in the distal surfaces of laterals and canines, the shades of the color should be lighter than for inlays on their mesial surfaces.

A study of the colors of the teeth should be made before the porcelain for the inlay is selected. While the pigments of the tooth determine its color in a measure, the thickness of the dentin and enamel and the density of these tissues, with their power to absorb, transmit and reflect light, are also factors. The colors of most teeth containing no foreign pigments are yellow, blue, brown and gray, with a yellowish or bluish hue. Normal dentin is some hue of yellow, while enamel contains a variety of colors.

In the selection of colors for an inlay, note the variation of color in the natural tooth, in which three or more colors or hues of colors are usually found. The foundation, which is that portion of an inlay replacing the dentin, should be yellow (presuming the tooth to be vital), and the enamel, or colors which replace the enamel, should approach the colors of the tooth in their respective locations. The thickness of the layer of enamels governs the intensity of color, and in most cases quite intense colors should be used. There is a difference of opinion regarding the application of porcelain for inlays, and this has resulted in different methods of applying the porcelains in the construction. Some prefer to apply the enamels in layers, some prefer to mix the colors, while others prefer to construct them by using porcelain of a lighter hue than the tooth and coloring the cement with pigments to approximate the color of the tooth.

The method of using porcelains of a lighter hue seems to have no advantage except for labial cavities, and it is open to criticism. It may be advantageously applied, however, in labial cavities where the angle of incidence is always such that some rays are feebly reflected and others are partially absorbed by the cement. It seems hardly possible to construct inlays for approxi-

mo-incisal cavities requiring two or more colors by lightening the porcelain and coloring the cement to match the colors of the different sections of the tooth. There is a sameness of color in these large inlays that is objectionable.

The method of building inlays in layers is probably the most popular, and seems to have many advantages. Enough foundation body to approximately replace the dentin should be used and fused. Care should be taken in the application of enamels to prevent porcelains of different colors from becoming mixed while applying them to their respective positions. The colors should be applied separately and biscuited, then a uniform color should be applied over the entire mass and fused. If the colors are applied intensely enough to reflect through the uniform color there will be a harmonizing of colors, and each color will preserve its identity and approach more nearly the natural tooth-structure in appearance. This method obviates the necessity of using porcelain of a lighter hue and adding pigments to the cement. It also breaks up the uniformity of color so often noticeable when an inlay is constructed of a monochromatic porcelain.

MIXING COLORS.

There are conditions under which I deem it advisable to mix colors in the construction of inlays. The yellows may need to be toned with grays, the grays to be brightened by the addition of yellow, or the blues may be lightened by the admixture of a green or saddened by the addition of a gray. While it is unnecessary to mix colors in the construction of most inlays, there are cases, however, in which I find that the mixing of colors gives better results than I can obtain by applying them in layers.

In mixing two porcelains or in applying them in layers it must be borne in mind that the formation of the color is primarily due to the power of the combined porcelain to absorb, reflect, or transmit light. When two colored porcelains are mixed, or when they are applied in thin layers, the resultant color is that which is reflected or transmitted by both colors in common. When two colors, as blue and yellow, are combined, it is found that green is the only color common to both of them, and it is therefore freely transmitted or reflected, the others being absorbed.

If a layer of blue were placed over a layer of yellow, the light in passing through the blue porcelain loses its red, orange and yellow rays, which are absorbed, and are therefore not transmitted, while green, blue, and violet are transmitted to the yellow, which absorbs the blue and violet, leaving the green to be transmitted or reflected. The purity of the green is conditioned by the purity of the yellow and blue and the thickness of the layers. When blue is used to build the incisal portion of an inlay, the yellow foundation should extend only to the point at which the blue is to begin, for if the blue is applied over the yellow it will have a greenish hue. When yellows or blues are applied over grays or browns, the underlying colors have the effect of saddening the overlying ones because the transmitted rays from the yellow and blue are largely absorbed by the gray or brown.

I believe the method of constructing inlays of two bodies differing in density and fusibility to be the correct one. The foundation body should be not only of a higher degree of fusibility, but it should be of coarser texture than the enamels. The coarse foundation body can be thoroughly fused, and when the enamels are added to their respective locations and fused, the two porcelains will give a more natural combination of color than can be produced by a single body.

In applying the enamels over the foundation, each layer should be fused to a high biscuit only, and the heating of the porcelain to the point of glazing should be accomplished at the final fusing; for in the process of applying porcelain in layers and fusing each layer, the underlying layers will be slightly overfused and somewhat lighter in color.

The purity of colors in porcelain is partially dependent upon the accuracy of the fusing. The variation of the heat of the muffle will cause difference in the shade of the porcelain. Underfused porcelain is of a duller hue and less translucent, the blues appear lighter in color, and the yellows, browns and grays appear darker, than in properly fused porcelain; overfused porcelain is much lighter in color and has more of a glassy appearance.

It is to be regretted that so few dentists are inserting porcelain inlays. The majority seem to be content to wait until the system of construction is perfected. The technique may be perfected so

that better fitting inlays can be constructed, and an adhesive, insoluble, transparent cement which will solve the problem of their retention may be discovered. But success in inlay work does not depend altogether upon these conditions. To construct inlays in the most artistic manner requires some knowledge of the principles of color formation.—*Dental Cosmos.*

"MECHANICAL DENTISTRY" AND MECHANICAL DENTISTS. The art of dentistry is so largely dependent upon special manipulative skill in the application of mechanical forces that to designate one class of dental operations as mechanical, and thus, by implication, classify other operations equally requiring manual dexterity as non-mechanical, is to set up an untenable distinction. Even the term prosthetic dentistry, etymologically considered, is not fully adequate as a distinctive designation, inasmuch as replacing a part of a tooth crown by a filling is quite as much a prosthetic operation as replacing an entire tooth crown by the aid of a root, bridge or plate attachment.

The significance attached to words, however, is not always wholly consistent with their etymology; indeed in many instances words through usage acquire a meaning not justified by their root origin. By accepted usage the term prosthetic dentistry, or prosthodontia, is confined to the substitution of artificial for lost natural teeth, while the term operative dentistry is held to be inclusive of all operations upon the natural teeth and their immediately associated parts.

While owing to the essentially mechanical basis of dentistry, considered as a restorative and healing art, the term "mechanical dentistry" used in its usual distinctive sense is open to criticism, there is an obvious and proper distinction to be maintained between the operative and the exclusively mechanical dentist. The one is a surgeon whose prescribed field of work is upon the living human organism—the other an artisan engaged, chiefly or wholly apart from the patient, in a special field of constructive dentistry.

The perfect propriety of this distinction has long been recognized and from an early period in its history the mechanical dentist has had an important relation to dental art. Originally, the dental operator of necessity was his own mechanical dentist, and

even to-day a majority of dentists, either of necessity or from choice, perform the double role. As a rule, however, those who are most successful in securing a full operative practice find it advantageous to relegate laboratory work to an assistant, usually an apprentice or student who has acquired some degree of skill, or else a younger or less successful practitioner who seeks in this way to add to his income. In all the larger cities a few have always found it profitable to abandon operative work, establish independent dental laboratories and devote themselves exclusively to the making of artificial dentures from models furnished by the operative dentist. For highly skilled men this was a lucrative employment at one time, and was especially profitable to those who had high artistic ability in continuous gum work, the carving of porcelain teeth or the mounting of single gum teeth upon gold or silver plates, the latter two being by far the most difficult processes in prosthetic art.

With the great fall in prices which followed the introduction of vulcanizable rubber and other plastic bases, and, coincidently, the output at relatively low cost of various types of molded porcelain teeth, easily mounted and readily adaptable to a large range of cases, dental laboratories ceased to yield their former returns, and some of the most skilled mechanical dentists found themselves compelled to engage in other pursuits or open offices and enter upon general dental practice. To-day, by the average practitioner, continuous gum work is used only in a small percentage of cases, if at all, and the carving of porcelain teeth is almost a lost art, so little demand is there for the carved as distinguished from the molded product. Fortunately, with the incoming of porcelain inlays, crowns and bridges, there has been some revival of interest in a process by which in special cases an expert can produce results more admirably artistic than is possible by any other method. A few good porcelain tooth carvers still remain; others should be developed.

While the introduction of the plastic bases for a time lessened the number of exclusively mechanical dentists, a notable increase in their number has been observable during the past few years. This increase is the result of several contributory causes. Chief among these is the introduction of modern methods of making crowns and the general employment of bridgework in all its

various forms as a substitute for, or an adjunct to, partial plate dentures.

While fully recognizing the advantages of these modern methods, the busy operative dentist finds in practice that their construction is time consuming, often to a prohibitory degree, and as a matter of economy, if for no other reason, he has been compelled to call the mechanical dentist to his aid. To him good wages can be given, as a liberal fee is usually paid by the patient. Thus the old conditions have in a measure been restored. Artistic work, requiring for the best results a higher degree of skill than that possessed by the average dental practitioner, is again demanded, and for it profitable pay can once more be obtained.

Those who in recent times have entered upon the field thus opened are chiefly dental graduates who, having a natural talent for mechanics, with only a moderate endowment of those personal qualities which make the successful operative practitioner, follow the line of least resistance as determined by their personal aptitude. Added to these is a small contingent of graduates who have failed to pass state licensing examinations. There is also an increasing number of mechanical dentists who have had no training other than in a dental laboratory. Not a few of these are highly skilled mechanics who, before the days of dental colleges, would speedily have become full-fledged practitioners, but who now find difficulty in qualifying for practice by meeting the entrance and other requirements of the college curriculum, as demanded by the dental laws of the several states of the Union and by practically all foreign countries.

Whatever the influences which have directed him to that employment the mechanical dentist is becoming an important factor in the work of the dental profession in this and all other countries. While there can be no question that for the average dental practitioner who can afford to divide his fee, there is a distinct advantage in utilizing the services of a skilled mechanical assistant, such a division of labor in no sense justifies a neglect of prosthetic mechanics as a part, and an important part, of the training of the dental practitioner. In the years immediately preceding the introduction of those crown and bridge work processes which now form so close a connecting link between operative and prosthetic dentistry, a complete divorce between the two branches, both as to

dental training and dental practice, was favored by many. Even now such a system has its advocates, and the college teacher still finds students who, convinced that the purely operative field is alone worthy of their powers, are resolved not to soil their hands or lower their "dignity" by the practice of a "base mechanic art." Such students usually make little or no real effort to acquire thorough skill in the construction of artificial dentures. In this they make a great mistake, for if regarded simply as training of the eye and hand for strictly operative procedures, laboratory work is invaluable. Moreover, without such mechanical training the operative dentist is very much at the mercy of his mechanical assistant, for he can neither direct understandingly as to the constructive details of prosthetic work nor judge critically and authoritatively of the work when completed and presented for his approval.

The dental colleges of America have always recognized prosthetic mechanics as a necessary and important department of college instruction and have never relegated the teaching of that branch of dental art to a private laboratory having no organic connection with the college as an institution, as is the practice with a large percentage of dental schools in European countries. The result of such a system is that their graduates or undergraduates who come to this country to secure the much coveted American degree, while generally well informed in the fundamental branches of medicine and in the theory of dentistry, are often but poorly trained in practical dental mechanics. Subjects or processes which a school considers too unimportant to teach, the student will not regard as of sufficient importance to learn.

In Austria especially, where no one is allowed to practice dental surgery without having taken the full medical curriculum and obtained the M.D. degree, the distinction is very sharply drawn between the dental surgeon and the mechanical dentist, who as a rule has had no medical training. A curious development of the situation in that country is that mechanical dentists, being prohibited from performing any medical or surgical work in the mouth or on the teeth, have demanded that dental surgeons shall be restricted to medical and operative work and forbidden to make artificial dentures. Thus there has arisen a conflict which has continued for a number of years and to settle which parliamentary action has several times been sought. As stated by the

Vienna correspondent of the *Journal of the American Medical Association* (August 18, 1906), the result is that "A short time ago the government laid before the house of representatives a bill, in which a sort of compromise was effected between the two views. While the dental surgeons will be entitled not only to all medical but also to all technical operations in the mouths of the patients, the technical assistants will be allowed to perform certain small operations, such as the polishing and shortening of teeth for the purpose of fitting in of technical appliances, the straightening of irregular dental arches by means of india rubber or metal bands and similar minor, not surgical, contrivances."

Such a compromise can hardly be regarded as satisfactory to dental surgeons or as likely to promote harmonious relations between them and their mechanical assistants. That feature of the compromise which ignores the scientific aspect of orthodontia will be regarded with especial disfavor by those familiar with its recent advances both as a science and as an art. Fortunately, the character of the training of the operative dentist in America and the nature of the relation between him and his mechanical assistant are not of such a nature as to make probable such a conflict or possible such an outcome, should a conflict arise.—*Editorial in Dental Brief.*

SOMNOFORM IN MINOR SURGERY. By Noble M. Eberhart, M. S., M. D., Chicago. There are many minor operations in which the most serious point for consideration is the anesthetic to be administered.

This is true from the standpoint of both the surgeon and the patient.

The latter dreads to take chloroform or ether and frequently puts off having an operation on that account, especially as it usually means going to a hospital.

On the other hand, the doctor hesitates to subject the patient to an anesthetic which is more dangerous than the operation.

My attention having been called to somnoform through its use in dental surgery, I could at once appreciate how useful it might prove in sundry minor operations.

Its advantages as presented to me were:

1. Ease of administration; no choking or suffocating attending its inhalation.

2. Rapidity of action, averaging about one-half minute.

3. Safety. Death rate 1 in 500,000.

4. Absence of serious or prolonged after-effects.

5. Quick recovery without shock and ability to leave almost immediately as far as anesthetic is concerned.

6. Convenience. May be administered at office or house; requires no preliminary preparation; is not contraindicated by heart or respiratory lesions.

I tried it myself and found after three full inhalations a heavy natural sleep stealing over me; recovering immediately with no annoying symptoms whatever.

On another occasion I took it for the extraction of the root of a third molar, and the easy and pleasant induction of sleep, the completeness of the anesthesia, and the quick return to consciousness without unpleasant effects strengthened my already high opinion of somnoform.

I have used it as occasion offered and report herewith the results in a number of operations.

Somnoform is a general anesthetic composed of ethyl chlorid, 60 per cent; methyl chlorid, 35 per cent; ethyl bromid, 5 per cent.

Dr. Paden, who administered all of my anesthetics, has given a very thorough consideration of its properties and uses in his paper read before the Chicago Medical Society, April 11, 1906.

I will therefore proceed to relate my experiences with it.

Case 1. Man of 37. Hemorrhoids. Operated on two years before under chloroform. Was afraid to administer it again on account of an organic heart lesion. He was under somnoform about ten minutes, becoming thoroughly anesthetized in eight or nine inhalations. No trouble was experienced and he regained consciousness immediately with no feeling of nausea and experienced no unpleasant after-effects whatever.

Case 2. Case of hemorrhoids in a young man of 25; neurotic; refused to take chloroform or ether, which he had taken upon a previous occasion for circumcision. He was under somnoform 15 minutes, taking the anesthetic nicely and experiencing no after-effects except a slight headache.

Case 3. Removal of a needle from a woman's foot. The patient was very nervous and became slightly hysterical at the time anesthetic was administered. She was soon asleep and remained thoroughly anesthetized about 15 minutes, while I made a deep incision in the bottom of the foot and removed the needle, which was well up between the second and third metatarsal bones. Coming out of the anesthetic she vomited twice, but then felt all right and left the office in an hour.

Case 4. Case of fistula in ano in a man of 45. No trouble was experienced in administering the anesthetic. Patient was nervous and said he could feel his heart pounding and could see and hear part of the time, but felt nothing. He experienced no unpleasant after-effects and left the office in a short time.

Case 5. Opening an infected wound in the thumb. Under anesthetic three minutes. She took it readily and experienced no unpleasant after-effects, leaving office in ten minutes.

Case 6. Large, robust man of 37. Passing of sounds for rapid divulsion of urethral stricture. He required a large amount of somnoform to anesthetize, as he also would have required of chloroform or ether. The divulsion brought him to, so that he struggled and it became necessary to let him entirely regain consciousness; when he readily consented to take the anesthetic again for the completion of the operation. He was under ten minutes the first time and said he felt all right but dreamed of struggling with a man. The second time he was under about eight minutes, being completely anesthetized and recovering without any disagreeable after-results, leaving office in ten or twenty minutes.

Case 7. Man of 30; neurotic. Operation; slitting of meatus and divulsion of urethra. Took the somnoform quietly, but vomited very freely on coming to, but only once, recovering quickly enough to get up and help clean up the muss. He had eaten a very full breakfast shortly before. Divulsion brought him out of the anesthetic.

Case 8. Slitting of meatus. Ordinarily the slitting of the meatus is too trifling a matter to call for the administration of any anesthetic, but in some extremely nervous individuals and in some cases where a second and third cut may be needed, it is certainly convenient to have a patient completely anesthetized; especially

when it can be done as easily and quickly as with somnoform. In this case the anesthetic was taken quietly and there were no after-effects.

Case 9. A boy of 12 years was brought to me with a rifle bullet in his left hand. I located the bullet with the fluoroscope and took a skiagraph for the attending physician. The boy was then taken home and chloroformed and free incision made, but bullet was not found. Accordingly, a few days later he was brought to the office and was given somnoform and by the use of the fluoroscope, which enabled me to see both bullet and forceps, I was able to extract it easily in two or three minutes. The boy vomited after regaining consciousness, which was presumably due to getting too much of the somnoform, as it was administered in the dark and the anesthetician could not see how much he introduced into the inhaler each time.

Case 10. Another case of slitting of meatus. Anesthetic taken quietly and no after-effects.

Case 11. Denuding clitoris. Patient a very nervous and hysterical woman. Took the anesthetic nicely, but vomited on recovering and slept for over an hour afterwards on the operating table, rousing when spoken to and immediately going to sleep again.

Case 12. Woman of 47. Took anesthetic nicely and remained under it about seven minutes while I removed with the electro-cautery a suspicious growth on the cervix uteri. No nausea or any distressing symptoms.

Case 13. Boy six and one-half months old. Circumcised under somnoform anesthesia. No unpleasant symptoms.

Case 14. Slitting of meatus and passing of sounds. No unpleasant effects.

From the foregoing it will appear that ordinarily no unpleasant effects attend the administration of somnoform, but occasionally headache and nausea are present.

Where nausea occurred in my cases it was not lasting.

Patients exhibit idiosyncrasies toward somnoform just as they do toward other anesthetics.

I have superficially classified various operations into suitable and unsuitable ones for somnoform anesthesia.

SUITABLE CASES.

1. Removal of tonsils, uvula, adenoids, and some other throat and nose operations.

2. Operations for bubo and many cases of removal of cervical glands, where latter are superficial and not too numerous.

3. Removal of small tumors such as dermoid cysts; moles; warts; small lipomas and fibromas, etc.

4. Removal of needles, bullets, splinters, etc., from accessible parts, especially from extremities.

5. Circumcisions; denuding of clitoris; many cases of hemorrhoids; slitting of meatus; lancing of boils, abscesses, etc.; opening and drainage of infected wounds, etc.; ingrowing nails, etc.

6. Opening pelvic abscesses for vaginal drainage.

7. Excising small epitheliomas.

8. Amputation of fingers or toes.

9. Reduction of some dislocations and in cases of compound or comminuted fractures.

10. Stitching up minor wounds.

11. Reduction of strangulated hernia.

UNSUITABLE CASES.

1. Not suited to operations requiring over fifteen or twenty minutes to perform.

2. Not suited to operations on vital parts, or where serious inconvenience would result from patient coming to in midst of operation.

3. Not suitable for rapid divulsion of urethra or rectum.

4. Not suitable in some eye operations (as in iridectomy), where very profound anesthesia is required.

I decry the unreasonable stand taken by some dentists who try to alarm the profession by exaggerating the danger from somnoform.

Present statistics indicate that the death rate is one in half a million; but were it one in 25,000, as with nitrous oxid, it would still commend itself on account of its other advantages.—*American Dental Journal.*

MENTAL INFLUENCE IN THE DENTAL OFFICE. By W. H. Whitslar, M. D., D. D. S., Cleveland, Ohio. Next to the physician whose errands of mercy and visitations of homes wherein observances of the frailties of human nature provide him with food for thought and worry, the dentist stands in a relation, at least in many instances, almost the same.

Pain, which is the monitor to admonish us of disturbances of the economy, is the dread of humanity. It drives all beings to seek relief. For this reason the dentist is visited or is called sometimes to the bedside of one in extreme agony. Pain frequently causes the mind to be distracted, and self-control is lost wherein the inner feelings are dominated by grief or anger. In the observation of these conditions it is the duty of the dentist to recognize their cause and avert the difficulty if possible by his sympathetic and manly demeanor. This requires experience and also the art of using rightly his knowledge of human nature. In fact, he should rise above the routine of mechanics and cultivate a superior knowledge of the properties of mind and the uses for which it is intended. Under such conditions the personality of the dentist becomes a guiding factor in the evolution of his successful practice. Indeed, the personal equation is a decided element in the production of success. Fortunately, however, the methods and means of operative procedure are improving, and each year finds us better qualified to use what we possess. Therefore, it is reasonable to say that the terrors of a dental office are passing away, dependent upon two conditions, i. e., the improvement in the science of dentistry, and the enlightenment of the people.

There are events occurring which rob the profession of its dignity, and defeat its objects. Briefly considered, it is harmful to our best efforts to have newspaper articles concerning our professional meetings headed with, "Tooth Carpenters in Session," and similar references, which lower the tone of the paper itself, at the same time showing its lack of appreciation of a beneficent profession. Another reflection is the obnoxious advertising of charlatans, who resort to hideous pictures of teeth, with false promises of quality of service, and special prices. At the entrances of such offices we observe alluring specimens of workmanship, to-

gether with perhaps a bushel of offensive extracted teeth. Worse than this is the street fakir who exhibits his skill extracting teeth before a gaping crowd at a street corner.

He who wears a tooth as a charm on a watch chain, or talks about his skill in public or private places, provokes adverse criticism of his profession and prepares patients to consider him lacking in skill.

Well-meaning parents often are in error in telling children of their own suffering in the dentist's chair. This prepares a child to do its worst and makes it a coward at the outset.

The above diversified conditions are but a few examples of the ways and means that prepare the minds of people for an incorrect conception of the scope and benefits of dentistry. It is thus readily conceived how the mental condition of many is at variance with the real conditions ere they enter the dental office. Disseminating knowledge to correct these conditions becomes a part of our duty. To do this we must become broader in general knowledge and useful as citizens, that the dentist and his profession shall receive greater respect and confidence. It is confidence that wins hearts and minds. It is the half-hearted and non-confident persons that tend to lessen the endeavors of one that tries to be helpful to them. Therefore, preparation for the profession, reputation for ability, character, and environment, are the factors that place the dentist in a sphere of his own. In the construction of this world of his own an atmosphere of faith is required. It is the keystone to every mental process in the practice of dentistry. Without faith the sufferer has to be led, and without faith in his ability the dentist fails. Therefore, as said before, he must build upon his ability, character, and usefulness to his fellowman, having his office and equipment bear evidence of professional attainment. Yet, with all these attainments, there are those who lose business through personal uncleanliness, i. e., unclean fingernails, tobacco breath, drink, etc., which makes a disgusting spectacle. These mental impressions are carried home and told to friends. Likewise are racy stories or any confidential remark about another dentist distributed. The simplest remarks made in an office are quoted, making it really a study to say those things which will give information in a way that is understood, or to speak words of comfort to those in fear or in actual pain.

Generally, patients come to us having worried about what is to be done, and generally, too, they leave the office finding that their worriment was not realized. This was accomplished by an inspiring faith.

Bad faith is engendered by poor service, rough handling of instruments in the mouth, making an instrument table of the chest of the patient, tipping the chair too far back, unclean instruments, etc. Viewed from the patient's standpoint there are a multitude of thoughts permeating the mind during a dental operation. Previous experience leads him to enter the chair with an interrogation point as to his chances of escape. Vivid imagination now prevails, and at this point the quiet demeanor of the dentist will quell a fast-beating heart. The whole situation depends upon mental influences. It is a question of faith, and how far the faith will be carried. Observe now that the eyes and ears have given the mind an insight to all external surroundings—and this same mind led the patient to reason that his physical self should receive a dentist's care. Besides this, the law of self-preservation is embodied in this conclusion. This is wisdom doubled, for when persistence of this intelligence ensues it subjects the body to a greater power of resistance to pain. There is a central intelligence that seems to govern the whole situation. It is also impressionable, and the effects are proportionate to the power that stimulates the sub-conscious mind. In other words, there is a power of the mind that controls the sensations, emotions, and conditions of the body.

The mind is considered dual in its nature. That which perceives through the senses and in the mind of ordinary waking consciousness is termed the objective mind. The subjective mind is used when the objective senses are asleep or inhibited. However little the subjective mind may be used it responds to suggestions either from someone else or from the person himself, and since it controls the sensations and conditions of the body, suggestive therapeutics work within this mind irrespective of the objective mind.

It seems to me that the whole trend of suggestive therapeutics is dependent upon faith. Hudson says that, "While the faith that is required to make therapeutic suggestions effective is primarily the faith of the subjective mind, nevertheless suggestions

are most potent when they are not antagonized by any resistance whatever, either intellectual or emotional. Hence it is that suggestions which are based upon scientific truth, other things being equal, are necessarily the most potent in their influence and permanent in their effects. As in all other relations of human life, truth is mightier than error or falsehood, and it is the condition precedent to all permanent good."

From the above we perceive that to accomplish good results we must rely upon scientific truth and that which eliminates all fraud. In the treatment of patients, an appeal to reason rather than to credulity enables one to accomplish better results with his operations. The effects have a permanency which would otherwise be transient if fraud or trickery were practiced. In the treatment of children especially it is better to be frank and truthful. Indeed, "suggestion" is one of the most important factors in the education and development of children, because it brings about a requisite mental condition. If we apply "suggestion" in therapeutic uses, then it would be addressed to an intelligence whose faith can be induced and the suggestion carried into effect.

There is a condition in the practice of dentistry that is observed by every dentist, namely, the inability to place himself *en rapport* with his patient. Nature seems repellant, temperamentally at least, and the mind and entire nervous system is disturbed or out of harmony. There is no "animal magnetism," so called, in evidence. Dentists notice these conditions more than any other class of doctors because of the fact that the hands and fingers are constantly being placed upon the face and head. In the finger tips are located tactile corpuscles which are, next to the tongue, the most sensitive of the body. Through these terminals of the nerve system are received impressions which establish a chain of communication between the suggestive mind of the two individuals. Hence there is perceived by the dentist an impression or suggestion of disapprobation. It is this which wears upon his nerves and tires him out, even though he combats it with suggestive treatment.

There is a possibility in the dental office of dangerous suggestion being given by allowing observers to an operation. As an example, a lady witnessed the painless removal of a pulp from the

tooth of a daughter, which made such an impresison upon her that it became an exciting agent in the hallucination of the mind that her own teeth were mistreated. Another example is illustrated by the uninformed who witness the administration of nitrous oxid gas and observe the color changes of the face.

Other examples could be given, but it is desirable to conclude with one other class of mental conditions to be observed in dental practice, and that is the mental phenomena connected with anesthesia. One of the common conditions met with in giving an anesthetic is the expression of fear and resistance to its administration or influence. This is where resistance has not been overcome by either reason or suggestion. On the other hand, it is frequently noticed that in the lighter stages of anesthesia, both at the beginning and closing of the use of the anesthetic, one of the chief traits is increased suggestibility. This is very important since it is desirable to know what element produces reaction to the conversation of attendants, or if any responses reflect the normal habits or idiosyncrasies of the waking condition. Or, do they belong to the experiences of the past? These and many other questions are now occupying the minds of psychologists.

Under anesthetics, the majority of patients have illusions or hallucinations. A little girl having a tooth extracted supposed she was thrown into the air by a locomotive explosion. Another patient imagined he was trying to swallow the earth. Erotic sensations during the anesthesia are observed. These occur more from ether than from any other anesthetic. Cocain is reported to have the same effect. Women are more subject to this condition, and it is liable to occur nearest to the periodic congestion. Under these conditions grave charges have been made in court against dentists and sentences to the penitentiary pronounced. No dental practitioner should administer anesthetics to female patients unless an attendant is present to avoid false accusations and blackmail.

In conclusion, it is gratifying to say that the perusal of this subject has been helpful to me because, no doubt, it has the element of autosuggestion in it; and it leads one to study other natures and apply knowledge in the direction of doing that which will prolong happiness and life.—*Dental Summary.*

STERILIZATION AND DISINFECTION AS RELATED TO WATER, INSTRUMENTS AND SOFT TISSUES, INCLUDING PUTRESCENT PULPS. By A. W. Harlan, M. D., D. D. S., New York. Water should be free from contaminations prejudicial to health. It is not a necessity that water should be distilled in order to drink it, or use it as a solvent for disinfectants. It should be odorless and free from taste, and show absence of acids, chlorids, and sulphates. If the organic matter, including solids, reaches much above 15 or 16 parts per thousand it usually needs to be precipitated and filtered. This is accomplished in various ways. Formerly alum was used (and is now) for precipitating certain albuminoid elements of water. Recently, however, much attention has been given to the use of copper sulphate and colloidal copper for purifying water for drinking purposes and for sterilizing it so as to render it free from noxious bacilli and bacteria. The question of pollution of water from sewage and outhouses, barns, drains and like sources of contamination is one that need not concern us to-night. Any supposed potable water may contain large numbers of bacteria, that are harmless, but if there are two or three to every liter of water that are pathogenic, then we need precipitation and sterilization.

How It Is Accomplished.—If you will take a copper boiler or pot and have the interior thoroughly polished and leave the water standing in contact with this surface for three and one-half hours, the various substances floating and dissolved in the water will be precipitated, in consequence of the solution of a small portion of the polished copper surface. This will not affect the taste, but the water will be sterilized. If the water is then filtered it is ready for use. It is not necessary to boil it to drive off the gases, as that will make it taste insipid. Water which does not hold gases in suspension is usually tasteless. We prefer water which is pleasant to the taste and for all growing children a pure water is a necessity; distilled water, even if aerated, lacks as a constituent the inorganic salts which are so necessary for growth of bones, teeth, cartilages, nails and hair. When we want to sterilize water quickly we take a copper coil, place it in a jar or pitcher of water and turn on the electric current and in ten minutes we will have copper sterilized (boiled) water for use at the chair or elsewhere.

Sterilization of Instruments.—This is a certain method and not injurious to your hands or the instruments. Many methods of sterilizing instruments are in use just as there are many ways of disinfecting the hands. A pint of copper sterilized water is placed in a glass dish, add five grains of dried sodium carbonate and immerse the instruments (which have been scrubbed with a sterilized brush in sterilized water) for five minutes, and then rinse them with copper sterilized water in a second dish, and dry them with cotton cloths that have been heated to 350 degrees F., and place in a covered glass dish and they are ready for use.

The paper or cloth covers for the operating table may be sterilized with dry electric heat in a suitable sterilizer operated with a small electric cooking oven. It is understood that the office girl will scrub her hands in liquid soap or green soap and rinse them in diluted alcohol before rinsing the instruments. This will require only a stock solution of one ounce to the pint of copper sterilized water. All of the solutions used around the chair can be made with sterilized water. In all cases it should be filtered through clay or some other approved substance, to remove the precipitate. It has been found that one part of colloidal copper will sterilize 8,000,000 parts of water, so there should be no need of the fear of being poisoned with dissolved copper.

All of the soft portions of the mouth, gums, tongue, lips, cheeks, palate, may be disinfected by using a carbonated copper water to which is added ½ gr. to the ounce of dried sodium carbonate, large pellets of cotton wool, previously sterilized, are used to swab the mouth; these are carried with large, flat, wide pliers made of copper, polished after using, so as to be ready for the next case.

Disinfection as Related to Decomposition in and Around the Roots of the Teeth.—Before reading the whole paper I wish to take you into my confidence thus far: We are told that we can disinfect with sodium dioxid with kalium-natrium (potassium and sodium) with 1 to 500 or 1000 of bichlorid, with cresol with iodin and sodium iodid and water, with formol—with formalin and cresol to say naught of many other substances. There are persons who think even now that they can disinfect with zinc chlorid when it has been known that any pus-producing spore will live in a satu-

rated solution and come to life just as soon as he is planted in a suitable medium for growth. Do you wonder then that we are only beginning in our knowledge of root disinfection, of infected and poisonous substances from decomposition of animal tissues? Much confusion exists on this subject in the minds of those who get all their information from supposed chemical reactions taking place within a pulp chamber during the process of decomposition of the pulp. When we consider that cadaverin has the formula of $C_5H_{14}N_2$, and neuridin has $C_5H_{14}N_2$, and putrescin $NH_2\ CH_2\ (CH_2)_2$, $CH_2\ NH_2$, $C_4\ H_{12}\ N_2$, and acetic acid $CH_3\ COOH$, to say nothing of indole, cresol, skatole and other substances too numerous to mention, is it wonderful that mistakes are made? All of these substances, and even others, including phenol itself, are to be found in the decomposed pulp, and they are to be reckoned with as the final end products of decomposition of the pulp. Pin not your faith to any universal destroyer of mephitic gases and odors, and the poisonous by-products of these numerous decompositions and redecompositions.

If you can first cleanse the solid alkaline and aminoacid products of decay from the pulp chamber and then attack bacteria and their spores, you are more certain of complete disinfection than to depend upon a gas destroyer alone to modify them. With these brief remarks I will present to you in a condensed form my own observations. The complex and elusive substances which we are to combat in some cases are transitory. They vary in quality, so that we are unable to fully estimate the virulence of the infection. This will explain why there may be a failure at times to disinfect. Hence, we are compelled to overwhelm not only the organisms and spores, but the multifarious end products of decomposition. Many of these are soluble in water, so that is the hint for the first step in disinfection.

Disinfection necessarily implies infection. For our purpose tonight we will confine our remarks to a consideration of the effects of decomposition within the root of a tooth or around it. The effect of the retention of decaying and decomposed pulp tissue on the dentin and cementum of the tooth is to poison them, and if any of the products of decomposition pass through the end of the

root, there is irritation, inflammation, and usually suppuration. This is what we wish to avoid.

I need not describe how or why a pulp dies; we find it dead when there is decomposition in the root. (Very rarely is any portion of the pulp alive when there is decomposition in the root.) In this decomposition we have H_2S and NH_3, two gases which will produce pressure and give pain to the surrounding tissues, including the whole organism, unless there is an outlet provided for them. You are all familiar with the pain produced by a forming abscess, which is usually presented to you at an inopportune time. To convert ammonia and hydrogen sulphid into a solid or liquid is said to be the surest and most certain method of disinfection. The alkaloids, putrescin, cadaverin, and neuridin being solids are not acted upon directly by drugs except to withdraw the nitrogen. These alkaloids are soluble in water, so that care should be exercised to not use peroxid of hydrogen or liquids to force them through the apex.

Many methods have been proposed to render gases inert. Buckley uses formaldehyd and cresol. I have found that a crystal of monochloroacetic acid will do this. In all cases of putrescence within a pulp chamber or root canal, by first isolating the tooth and washing its interior carefully with copper sterilized water, then partially drying it, I place a crystal block of the acid in the center of the pulp chamber, and if there is not sufficient moisture a drop of sterilized water is added. Within five minutes the tooth may be sealed hermetically with cement.

I prefer a quick-setting cement, mixed soft. Leave this tooth alone for a few days and open it under antiseptic precautions. This means to not allow saliva or hydrant water or an unsterilized broach or instrument to enter the root canal or go through it to push any foreign matter into innocent tissues. In this process if the tooth were discolored it is bleached at the same time that the disinfection is being accomplished. By this method we only generate a gas to break it up and make oxidizing agents of the gases of decomposition and the numerous animal alkaloids present within the tooth.

For more than seventy years we have been groping for some drug that would control and minimize gaseous production during

the putrefaction of pulp tissue. This will do it and at the same time hold the color of the tooth. You do not need to be changing the dressing every day or two, for it is not needed. The worst case of putrescence will yield after two treatments at intervals of one week. If there is a blind abscess at the apex of the root, it must be drained and washed with sterilized water and a crystal of the acid introduced and sealed into the cavity to remain for a week or even longer. After these dressings are removed and the roots are washed with sterilized water and dried, they are to be filled to the apex if possible. (You may use this acid in 10 per cent solution to inject through the root and the fistulous tract leading to the surface of the gum.)

Disinfection Around the Roots of Teeth.—In all cases of suppuration of the sockets (not mercurial or syphilitic) it is necessary to disinfect the mouth first of all. Second, to remove all deposits from the roots of teeth, including the perceptible edges of necrosed bone. The sockets are to be deluged with cleansers first, and then every pocket (where there is a pocket) is to be burned with some destroyer of tissue—lactic acid, trichloracetic or monochloroacetic acid. I prefer the latter, as it will destroy the sickening odor that we find exhaled from the mouths of pyorrhea patients. After teeth are treated in this manner they should be left alone. It is suggested and urged and commanded that teeth should be lashed together or bolted with staples or banded or held with bridges or fixtures so that reparative processes will not be interfered with. After all, is it not logical to insist on the mouth being kept clean, and the patient's system flushed with water to wash out the autointoxicants and give the tissues an opportunity at the ends of the arterioles to build new supports for loose teeth? If you destroy the local causes of decomposition and obliterate the pockets, even though you lose some useless gum tissue, the patient is the gainer and he saves his teeth for daily use, and is free from suffering every time he tries to masticate solid food. —*Dental Review.*

PORCELAIN VENEERS. By Edgar West, D. D. S., Memphis, Tenn. We have in the porcelain veneer a development in the porcelain art, as yet, not very generally practiced, even by those

who are quite well versed in inlay general prosthetic porcelain work; hence for the benefit of some who may be yet unacquainted with the subject, I will by way of an explanation, short and to the point, describe the porcelain veneer as being a porcelain shell crown, made to fit the stump of the natural tooth, corresponding in form and color shades, matching the natural organs.

Doubtless many of us, if not all, have been asked by patients if it were not possible to restore artificially broken down teeth to a natural appearance, without the necessity of cutting off or devitalizing such teeth. The veneer supplies this long-felt want and hitherto impossible desideratum.

Especially is the veneer applicable to cases where any of the six anterior teeth under ordinary conditions are broken down with large proximal cavities extending to the cutting edge, large labial cavities, or where mechanical abrasion has so altered and destroyed the shape of the tooth as to require an operation to restore its length and contour. In fact, I think I am justified in the bold assertion that the veneer is applicable and indicated in almost all cases where a dowel crown is commonly used for restoring an individual tooth. At the same time, I will say that the success or failure in this, as in most dental operations for that matter, depends on the development and proper application of the technique, and also the operator's quality of judgment and skill in providing for the form, stress, reinforcement, etc., each case presenting in some respect a different shape, consequently necessitating a different construction to meet these requirements.

A general description of the process of constructing a veneer is as follows: Grind off about one-fourth to one-third of length of tooth, also proximal surfaces from point to the gum line, keeping in mind the position of the pulp. Then with a wheel bur cut through enamel on the face, following the cervical line. Form the groove thus made, grind off the face of the tooth, thus leaving a shoulder at the gum line. Continue this shoulder proximately and across the palatine surface, dressing down the shoulders accurately and slightly converging the facial surfaces of the stump at angles toward the point and back.

For the matirx use the same gauge platinum as for inlay work. Burnish the platinum to the face and anterior shoulders, letting

sufficient excess extend over the end and sides to fold over to the back of the stump. Hold the metal firmly in place on front, fold over to the back, lap over and burnish to position; trim off excess and reburnish. The matrix is then ready for the first bake of body. After selecting carefully the desired colors, mix the foundation cervical color to a thin consistency and lay all over the matrix about half the thickness of the intended shell of veneer, carefully keeping below the height of shoulder; then bake to about the gold fusing point. Replace the matrix on the stump, crushing or mashing into close adaptation the partially baked body, which, by its stiffness, assists in holding the matrix in shape. Care must be taken at this stage to reburnish the margins and shoulders all around, as on this the accuracy of the finished margins depends. The next bake is practically a continuation or completion of the first—principally for the filling in of the cracks and crevices caused by shrinkage and the crushing process.

We now have a solid base of porcelain on which to carve and shape the tooth form. This is best done in the mouth, protecting with cotton rolls, using a spatula and a thick mix of the required body; each color being laid on in proper proportion with an eye to shape and the blending of shades in each successive bake. I would say here that the body should never be baked above the gold-fusing point until the last two bakings, as the first layers will by repeated firing be overbaked and hence the strength of the porcelain greatly reduced. This stage is one that requires patience and most careful observation, but with a due amount of both the work is rapidly executed. About from four to six bakings will be required from first to last in finishing a veneer. When completed allow to cool gradually, strip out the platinum, and cement in place. White cement is required, as it brings out a true color with the least modification.

As to the strength and durability of the porcelain veneer, which is doubtless a question in the minds of many present, I will say that within two years I have put on some sixty or sixty-five in mouths affording a wide assortment of conditions, and of this number only three have given way and these were unusually small and fragile, and were also subjected to a greater stress of mastication than is usual. "The proof of the pudding is in the eating."

When we consider the incompleteness and failure from an esthetic standpoint, even with the very best operators, in cases where the peculiarities of shape, unusual arrangement of colors and deep-seated stains cannot be matched from the stocks of ready-made crowns and facings, we must admit that in the use of the properly constructed veneer we have made a decided step in the onward march of perfection in the art of dentistry.

Viewing the results obtained as compared with the ordinary methods, where teeth are devitalized and restored with dowel crowns, with the risk of future alveolar trouble and chronic cervical inflammation, we must admit that some merit and advantage exists from a pathological standpoint.

In conclusion, I will say that those interested in the wide field of porcelain art and its multitudinous possibilities in esthetic perfection, have but to develop this subject in a practical way to decide that truly, "There is poetry in the dental art," and that one of its most beautiful songs is the porcelain veneer.—*Dental Brief.*

Clinical Digests.

DUPLICATION OF MODELS. By Dr. Walter H. Ellis, Buffalo, N. Y. The sculptor and professional plaster men have long been familiar with methods for the duplication in plaster, of statuary, busts, bas reliefs, etc. It is but recently, however, that our profession has felt the need of familiarity with the technique of any of these processes. More especially has the orthodontist, with his many valuable models, wished for a process by which to duplicate them, and it is with his needs in view that this paper has been prepared.

Any method that we may adopt will probably be along the lines used by the sculptor in similar work, with certain modifications to meet the requirements peculiar to our needs.

In order to cast a duplicate there must first be constructed, over the original, some kind of a mould in which to run the duplicate. There are three kinds of moulds in which plaster casts can be made: waste moulds, piece moulds and elastic moulds.

Waste moulds are of no value for the duplication of the ortho-

dontist's models, but it is by this means that we get the original, for the impression and the subsequent cutting away is a form of waste mould.

"A piece mould is made up of a number of pieces so arranged that they can be placed together to form the mould." These pieces are sometimes very numerous, the Venus de Milo requiring three hundred. If the original be of plaster, it is first varnished with shellac and oiled. This fact alone would condemn it for our use, as we wish to keep the original as clean and fresh as possible. This form of mould is the one used in making plaster duplicates of antique statuary.

Elastic moulds are the best and most practical for the duplication of the orthodontist's models. "These moulds are made of

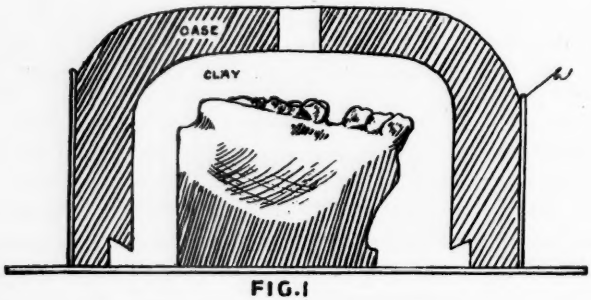

FIG. I

elastic material which will spring back into its original shape after being pulled from the cast and are kept in shape by an outer shell or case. The greatest advantage of this form of mould is the accuracy, ease and rapidity with which duplicates can be made."

Elastic moulds are prepared by the use of gelatine and glue alone and in combination with wax, paraffin, glycerin, etc., but the best grade of gelatin will be found most satisfactory for our use.

The first step in the process is the preparation of the shell, or case which confines the gelatin while hardening around the model and serves later as the case to hold the gelatin mould in place while running the duplicate. Wrap the model that is to be dupli-

cated with bibulous or tissue paper to protect it from the clay with which it will next be encased. Make this layer of soft moulder's clay about three-fourths of an inch in thickness, covering the top and sides but not the base. The thickness of the clay determines that of the gelatin mould. Place the model with its clay covering upon a glass slab. Put a small block of clay upon the top (Fig. 2-b) to form the opening in the case through which the gelatin will be poured. Wind a thin strip of clay (Fig. 2-a) around the sides close to the base, the upper surface of which should slant down as well as in, in order to form a slight undercut groove in the base of the case, which will later serve the purpose of keeping the gelatin mould firmly in the case when the duplicate is run. When this is done, build up a case of plaster

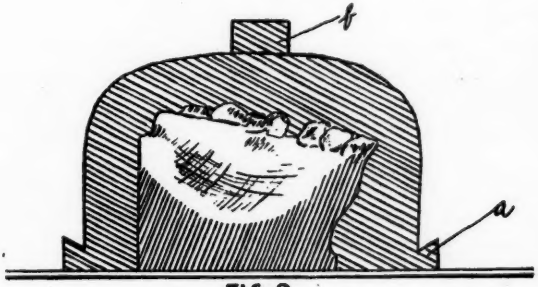

FIG. 2

over the clay. This can best be accomplished by first building up a wall of clay (Fig. 1-A) standing about an inch away from and around the model which will confine the plaster. When the plaster has hardened, remove the clay wall and take out the model. The case should be trimmed and shaped, and its inside given a good coat of shellac varnish.

It is unnecessary to make a new shell for every model duplicated, for after having made a few, one can readily be selected to fit any model. These shells are fairly serviceable, but being of plaster, will, with frequent use, wear and chip, especially around the base, allowing the liquid gelatin to escape while being poured. More serviceable shells can be made of tin or wood.

A case may be made of wood. It follows the general lines of

the plaster shell, is easily handled and works very well, but is rather light, needing weighting down when the gelatin is poured in. I have been using such a case in preference to the one constructed of plaster.

There is a case made in Germany which is constructed of tin. It is an ingenious affair and has its good points, but it does not hold the mould very securely, while the duplicate is being run.

Having the case ready, the model should now be prepared. All that is necessary to keep the gelatin from adhering to the model is to give it a thorough brushing with powdered soapstone, applied by means of a soft camel's hair brush. However, if a more impervious coating is desired, one which will allow of a more ready separation of the model from the gelatin, it can be given a very light coating of a stearin mixture prepared by melting two pwts. of stearin in one ounce of kerosene oil. This coating apparently evaporates in a few days, leaving the model practically as white and clean as before. But for those who wish to preserve the original in all its whiteness, a good, thorough brushing with soapstone will be found to be quite sufficient. The model should now be lightly fastened to the glass by means of a small pellet of gum. Give the inside of the case a good coating of the stearin mixture and set it over the model, which should be exactly in its center, leaving an even space all around for the gelatin. Figure 1 shows this very well; the clay, of course, having been removed.

It is now ready for the gelatin, which must be prepared and handled with the utmost care. I have been using the best grade of French gelatin which is made for use in jellies, clarifying wines, etc. It comes in thin sheets put up in pound packages, costing forty or fifty cents a pound. Procure an ordinary double boiler in which to melt the gelatin. The sheets should first be dipped in water, then placed in the boiler, with enough water to make it of the proper consistency when melted—one teacupful to one-half pound of gelatin will be about the right proportion. It is very important to have it of just the right consistency; if too thick it will not be elastic enough. If too thin, it will be weak and flabby.

Heat slowly, only long enough to thoroughly melt it. In warm weather it is best when melted to add a few drops of carbolic acid, diluted in a little water, to prevent spoiling. Stir occasion-

ally and remove from the fire as soon as melted. It should not be used hot, but allowed to cool to about 95 degrees F., when it will feel neither hot nor cold to the fingers, meanwhile stirring occasionally that it may cool evenly. Pour slowly into the case. If it shows signs of leaking out under the case, a little wad of clay will stop it. Allow it to stand some hours, preferably over night, when the gelatin mould can be removed from the case and the model pulled from the mould. It should, of course, be worked very carefully in pulling it out, but this can be accomplished without cutting or tearing the mould or fracturing the model. There may be exceptional cases, however, where slits at the heels of the mould will facilitate matters. Allow to stand half an hour or so after the model is removed so it will settle back into shape.

The surface of the gelatin would not need treating to preserve its shape under the action of the plaster. It should first be brushed with soapstone, which fills in the pores and smooths the surface. After the soapstone is removed, the surface should be brushed over with alum water to harden it. (Alum water is prepared by dissolving half an ounce of powdered alum in one cup of boiling water.) When this is dry, brush very lightly with the stearin mixture, which will cause the duplicate to separate more readily from the gelatin. Olive oil or vaseline might be used instead, but are more likely to cause discoloration of the duplicate.

Use the best grade of plaster—one that sets readily, and mix very carefully, in summer using ice water, or the heat generated by setting plaster will injure the mould. Paint in the plaster carefully with a brush, gently shaking, to work it to place. Replace the mould in the case, laying a piece of glass over its top to make a smooth base for the duplicate. Remove the model as soon as the plaster is set, to lessen injury from the heat. Brush in a little soapstone and give it a very light coat of stearin mixture just previous to the running of each duplicate. This will keep the surface of the gelatin smooth and allow of ready separation, and also protects it from injury due to the action of the plaster.

Six to eight good duplicates may be obtained from each gelatin

mould, duplicates so good that they can hardly be distinguished from the original.

Gelatin moulds can be kept for a considerable length of time if placed in a cool, dry room and not exposed to the air, but it is best to run all duplicates needed when the mould is fresh, thus insuring greater accuracy.

When through with a gelatin mould, it should be cut into small pieces, spread out on paper in a cool, dry place to harden, thus keeping it from spoiling, as water in gelatin causes it to become mouldy. If it gets grainy or dirty, it should be skimmed and strained through cheesecloth. If well taken care of, the gelatin can be used repeatedly, requiring the addition from time to time of but little new material.—*Items of Interest.*

AN IDEAL ABUTMENT FOR SMALL BRIDGES. By E. B. Prentiss, D.D.S., New York. One of the most troublesome cases with which the average operator has to deal is the supplying, by artificial means, of a single tooth such as a molar or bicuspid. These cases would not be troublesome if the conditions were always what we would desire.

There would be neither hesitancy about supplying such a space with a strong as well as artistic piece of bridgework, nor very much doubt as to the best method to pursue, if the adjoining teeth on either side were found to be badly broken down, yet having firm roots upon which to construct the abutments.

In such a case everything is ideal for the very best, and our problem is greatly simplified. The one greatest objection, the dread of sacrificing tooth structure, has been eliminated; and the operator may go ahead boldly, using any one of the many old and reliable forms of crowns as supports.

The cases which do give us the most trouble, or at least have always been to me the cause of the most worry, are those with one tooth missing (usually a bicuspid or first molar), yet having a perfectly strong, sound tooth on either side. That space should be filled; but how?

Any one would hesitate a long time before cutting off such a bicuspid for the attachment of a crown as the anterior support; and I think most men would also hesitate before shaving down a

sound molar sufficiently for a shell crown. In my practice this method has been abandoned entirely and I have always looked for some means of fastening the tooth by less destructive attachments.

Having found the various forms of inlays an insufficient and unreliable support, I have tried the use of staples in several ways; nearly always with good results, but with more cutting of tooth structure than desirable. The method of cutting a groove all the way from the mesio-gingival border up over the occlusal surface, then onto the distal surface, where another tooth is to be found in direct contact with it, constitutes in my judgment a very dangerous operation. That groove in the approximal space must, of course, form a weak point, and no matter how well the staple may be fitted and the gold burnished, the fluids of the mouth are constantly held in suspension directly on the margins of the finished piece, where decay is almost certain to undermine it in the course of time. The fact also that it is extremely difficult to properly cut that groove and fit the staple and gold into it, adds very much to the danger. In that method also the lingual cusp is usually cut away to be replaced by a gold masticating surface, the half cap thus formed extending from the staple in the groove to the gum line over the entire lingual surface. This makes a very strong anchorage, as well as an artistic one, for the buccal cusp is left intact and no gold is allowed to show. It is, however, too destructive, especially when one considers that such a sacrifice is made for one tooth only; also too dangerous on account of extending the groove into the approximal space.

In casting about for some simple process I have not by any means disregarded the staple. The mistakes which I have made in its use have pointed out what I think is a much simpler way of using it, and one that is not fraught with danger; at the same time avoiding so much needless cutting of tooth structure.

My method of procedure I will describe in detail, making use of the cuts to illustrate. In the first place, we nearly always find a more or less V-shaped space where such a tooth has been lost. This is caused by the bulging of the teeth mesially and distally near the occlusal surface. Fig. 4. After I have selected a fissure bur the size of an 18-gauge wire (19 gauge is used for bicuspids) I cut a groove from the mesio-gingival line occlusally over the

mesio-occlusal angle and to the central pit of the molar. A hole is then drilled directly toward the center of the tooth on a line parallel with the direction of the groove on the mesial surface: this is extended as deep as the safety of the pulp will allow. Then with a corundum stone I bevel the mesio-buccal and mesio-lingual walls of the groove quite wide, running the stone up and down along the groove until the bevel has attained quite a width at the greatest diameter of the tooth. With a smaller stone the occlusal groove is then beveled, with the result as shown in Fig. 1. The shape is very similar to a cone with its apex at the gingival border. A piece of 18-gauge iridio-platinum wire is then bent into a staple so as to exactly fit in the groove (Fig. 2), after which an impression may be accurately taken in Detroit Compound by making it into a pencil and pressing it firmly against the staple while in position. The staple must be taken out in the

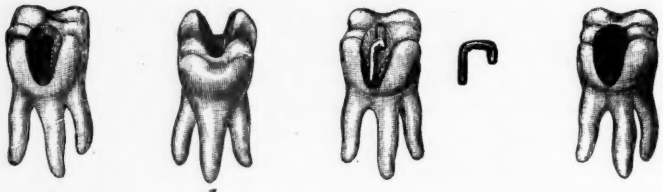

FIG. 1. FIG. 2. FIG. 3.

impression which is filled with plaster. On the cast obtained a piece of pure gold 36 gauge is burnished, being careful to press it well into the groove around the staple. The mark of the staple will be seen on the under surface of the gold, and if the two are put into position and held lightly with a pair of pliers they can be easily tacked with solder at one point. The piece is then placed back on the cast and reburnished, after which it should be trimmed to the same cone shape as the bevel on the mesial surface, always leaving a little overlapping all the margins. (Fig. 3.) I am now using the molar for my description, but of course in constructing an actual case the two abutments are carried along together. Both having now been placed in position, a plaster impression is taken, bringing the two pieces out in their proper places in the impression.

On the cast which is obtained an iridio-platinum wire is bent so as to dip down away from the bite and tacked at both ends (Fig. 5). This is done to stiffen the piece so that it may be used for trial in the mouth, and also to prevent warping in soldering. If the bevel has been properly made the piece will slip in and out without much difficulty; but if it does not the groove may be beveled wider and deeper at any point and the pure gold reburnished to conform to it. Fig. 4 gives a side view of the teeth, showing the piece in position, and also clearly showing the V-shaped or undercut space between the two teeth, which would make it impossible to get the bridge on or off unless the beveling were properly done.

Fig. 5 shows side views of both abutments when held together by the bar. A wax bite may be taken with the piece in position and then a plaster impression, which I always pour with Tenax

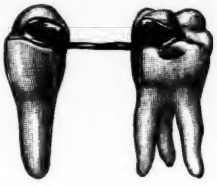

FIG. 4.

FIG. 5.

instead of plaster. It is an excellent investment and the bridge can be soldered on it without removing. If one desires, a facing may be ground in position and waxed to the bar while the piece (Fig. 5) is in place on the teeth; then it may be removed and invested for soldering.

Saddle-back teeth may be used instead of ordinary facings if one desires a porcelain occlusion. In such conditions, when the connecting wire is bent it should be brought very near to the gum so as to allow the saddle-back to be placed over it. After the tooth is backed and placed in position it can be invested and soldered as usual.

In case the tooth to be supplied happens to be a first bicuspid instead of a second, which has been described, then the plan of construction on the cuspid is varied slightly, although the principle is the same.

I usually drill two holes (size of 19-gauge wire), one on each side of the pulp and on a line parallel with the groove in the bicuspid, then with a bur the two are joined together, after which the groove thus formed is beveled with a small stone. A staple is then fitted into position. Now, to protect the distal surface of the tooth which comes in contact with the bridge, I cut out with a large bur a shallow cavity to cervical border, but wide enough to extend beyond the contact point buccally and lingually.

Pure gold is then burnished over the entire surface of the beveled groove and cavity, and soldered to the staple; then it may be reburnished and the bridge finished as before described.

Slight variations may be made in constructing such a bridge as the case may demand, but I believe that the greatest strength, the most artistic results possible may be obtained by this plan.

The finished piece is more artistic than if anchored by ordinary gold inlays, and yet it is strong enough to bear any strain which might be brought to bear on one tooth.

Best of all, however, one's conscience will not trouble him on account of needlessly mutilating two strong teeth for the sake of replacing one.—*Items of Interest.*

AMALGAM INLAYS.—They are all good. The principle upon which they are inserted is good. I insert both gold and porcelain inlays, and there are times when amalgam is indicated, as Dr. Ottolengui says, "not for cheapness, but because it ought to be used in some particular cases." Amalgam can be inserted on the inlay method which will be found extremely useful where it is difficult to give the cavity a retentive form on account of undue loss of tooth substance and where in order to obtain anchorage, the pulp would be encroached upon, or the tooth weakened. After preparing the cavity and thoroughly drying it, I prepare the amalgam. I now mix some cement (slow-setting preferred) and smear over floor and walls of cavity, not very deep. Then a piece of amalgam is placed in position and carefully but quickly pressed into place. If the amalgam has been squeezed pretty dry previous to use it will press out excess cement, which should be wiped off. More amalgam is added until desired contour is obtained, when filling is finished in the usual way. These fillings are held as firmly as are inlays by a thin film of cement, which serves the purpose of mechanical retention, preventing recurrence of decay, and a non-conducting lining, which *tends* to prevent thermal shock.—W. H. REABEN, *Dental Review.*

The Dental Digest.

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Editorial.

POLITICS IN DENTAL SOCIETIES.

A criticism which has long since been worn threadbare is frequently made of there being too much politics in dental societies. A rational study of this question will show to a thinking mind that there always must be politics in the management of any public organization. This is not more true of dental societies than of other societies, that to be prosperous and to be well conducted a society must be under the general management and influence of members of ability in this direction. Without such management and cooperation men will be put into office for the management of affairs who may not be equal to the occasion, either from lack of ability or experience in that direction.

This is especially true of dental societies. When such an organization is mismanaged, which sometimes occurs through placing the wrong man in office, the remedy is easy, because by a majority vote the officers are elected or changed. We have heard such criticism made of the best governed societies of this country. It generally comes from the individual who stands and looks on and is a barrier from his negative aspect, or has come in new, has his toes tramped on and goes home and nurses his resentment for the rest of his life and therefore takes no active part in the general good of the society.

We are penning these comments at this time especially on account of the severe criticisms that have been made for the last two or three years in regard to the management of the National Dental Association, and while some of these criticisms, we believe, have foundation of fact, the fault is not with the Association nearly so much as it is with our different local and state societies, in that they take little or no interest whatever in this national

organization, which should be the most important of all for the entire dental profession of this country.

As is well known, the membership of this Association is composed of delegates from local and state societies. Each society is entitled to one delegate for every five permanent members in its own organization, and it is optional with each delegate whether he becomes a permanent member or simply acts as a delegate and member for the current year. He has only to declare his desire for permanent membership, but despite this liberal method of swelling its ranks the National Dental Association has on its permanent list only about 350 members, instead of which there should be at least ten times that number. In fact, it ought to have 5,000 permanent members that would go to the meetings, bringing with them good material for digestion and taking an active interest in the work. Taking this view of the case, instead of advising members of the profession not to attend the annual meetings, we would advise exactly the opposite, for reasons that must be already apparent to the reader. Supposing, for instance, that every society in this country sent its representative men, thus bringing together what has been accomplished for good in all these societies during the year; let us try to imagine what the result would be with four days of literary communion of all the dental profession in this country that amounts to anything, this representing the membership of the different societies.

Tinkering with the by-laws and with the plans of the organization has been indulged in from time to time, the last experiment along this line being to change the plans so that the organization was almost wholly split up into sections, thus patterning after the American Medical Association, without regard to the fact that the latter has a membership of some 20,000, which made the section plan absolutely necessary in its case, owing to the immense amount of work to be covered and the large number of those in attendance at its meetings. In our opinion, the direction in which to use energy and the reform spirit should be toward obtaining a larger membership, which, as we have shown, can be achieved by having the local societies delegate men that will attend the meetings, stand by the Association under all conditions, and not simply use it as a means of obtaining honors, to be followed later by a lapse of membership.

Having been an active member of the National Association for forty years, and having missed but one of the annual meetings, and that on account of sickness, and having held the important and laborious office of chairman of the executive committee for over thirty years, we will be given credit for having given this subject some thought. We freely admit, however, having accomplished but little in comparison to the amount of energy and labor expended and are obliged to admit the humiliating fact that the National Dental Association falls far short of what it should be. The fault, however, has not been so much with the management in former years, but may be attributed in large measure to the lack of interest in our national organization in the quarter where such interest should really be most in evidence, namely, the local society.

In our next issue we will publish a history of the work of upbuilding the Illinois State Dental Society, by the organizer of this splendid achievement, giving somewhat in detail how between twenty-six and twenty-seven hundred men of the dental profession in the state of Illinois have been induced to join the Illinois State Dental Society, and in this connection we will outline plans that, we believe, would improve the outlook of the National Dental Association and make it a body worthy of the name and for what it stands.

Notices.

OSHKOSH (WIS.) DENTAL SOCIETY.

The Oshkosh Dental Society was organized Nov. 7, 1906, and the following officers were elected for the ensuing year: President, W. H. Ford; Vice-President, M. L. Christensen; Secretary and Treasurer, G. A. Stratton; Board of Censors, J. J. Geary, M. L. Christensen, C. C. Norris.

OHIO STATE BOARD OF DENTAL EXAMINERS.

The regular semi-annual meeting of the Board of Dental Examiners of the State of Ohio will be held in Columbus, commencing November 27th, 1906. Only graduates are eligible for examination.

Application accompanied by fee ($20.00) should be filed with the secretary by November 17th. For further information address

H. C. Brown, Secretary,
185 E. State St., Columbus, Ohio.

STATE BOARD OF DENTAL EXAMINERS OF PENNSYLVANIA.

The Board of Dental Examiners of Pennsylvania will conduct examinations in Harrisburg, December 11-14, 1906. For papers and particulars address Secretary Dental Council,

DR. N. C. SCHAEFFER, Harrisburg, Pa.

SOUTHERN ILLINOIS DENTAL SOCIETY.

At the twenty-first annual session of the Southern Illinois Dental Society, held in Centralia, Oct. 24, 1906, the following officers were elected: President, R. J. Hood, Sparta; Vice-President, J. K. Conroy, Belleville; Secretary, Harry K. Barnett; Treasurer, A. F. Range, Litchfield. The next meeting will be held in East St. Louis.

FIRST DISTRICT DENTAL SOCIETY OF NEW YORK.

The Thirty-eighth Anniversary Meeting of the First District Dental Society of New York will be held December 11th and 12th, 1906. For program and further information address

DR. B. C. NASH, Secretary,
143 W. 81st St., New York City.

EASTERN ILLINOIS DENTAL ASSOCIATION.

The Eastern Illinois Dental Association held its annual meeting at Champaign, Nov. 7, 1906, and elected the following officers: President, J. E. Adams, Paris; Vice-President, H. C. Tillotson, Mattoon; Secretary, T. A. Fulton, Charleston; Treasurer, A. E. Boyce, Tuscola; Librarian. Nannie Margason, Oakland. The next meeting will be held at Arcola.

SOUTHERN DENTAL SOCIETY OF THE STATE OF NEW JERSEY.

The regular monthly meeting of the Southern Dental Society of the State of New Jersey will be held in room 203, Masonic Temple, 415 Market street, Camden, N. J., November 21, 1906, at 8 o'clock. The essayist of the evening will be Dr. G. Lennox Curtis of New York City. Subject, "Some results following the use of septic instruments."

WM. H. GELSTON, Cor. Secy.

INSTITUTE OF DENTAL PEDAGOGICS.

The fourteenth annual meeting of the Institute of Dental Pedagogics will be held in Chicago on the 27th, 28th and 29th of December. The following subjects will be discussed: Teaching of Anesthesia; The Emergencies; how treated, how prevented. Teaching of Operative Technic. Teaching of Prosthetic Technic. A Method of Teaching Orthodontia. Teaching Porcelain Technic. Teaching of Materia Medica. Report of Committee on Dental Nomenclature. W. EARL WILLMOTT, Secretary,
Toronto, Ont.

ROCK ISLAND COUNTY (ILL.) DENTAL SOCIETY.

At the meeting of the Rock Island County Dental Society, held in Rock Island, Oct. 23, 1906, the following officers were elected: President, H. G. Trent, Rock Island; Vice-President, M. M. Everett, Atkinson; Secretary, W. H. Carl, Rock Island; Treasurer, R. B. Hinman, Moline.

IOWA STATE BOARD OF DENTAL EXAMINERS.

The meeting of the Iowa State Board of Dental Examiners, which was to have been held December 4th, 1906, at Iowa City, has been postponed until a future date. An announcement of the revised date will appear later.

E. D. BROWER, Secretary,
Le Mars, Iowa.

THE NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

At the annual meeting of the National Association of Dental Examiners held in Atlanta in September, 1906, the following officers were elected for the ensuing year: President, George E. Mitchell, Haverhill, Mass.; Vice-Presidents, F. O. Hetrick, Ottawa, Kan.; F. A. Shotwell, Rogersville, Tenn.; H. B. McFadden, Philadelphia, Pa.; Secretary and Treasurer, Charles A. Meeker, Newark, N. J.

News Summary.

JAMES O. FLOWER, 64 years old, a dentist of Pittsburg, Pa., died Nov. 8, 1906.

C. H. HARVEY, 57 years old, a dentist of Erie, Pa., was found drowned Oct. 29, 1906.

SAMUEL W. COOKE, 81 years old, a dentist of Worcester, Mass., died Oct. 26, 1906.

TAD SPEECE, a dentist of Muncie, Ind., was killed at Quincy, Ind., by a Big Four train.

WILLIAM W. ORMSBEE, 75 years old, a dentist of Geneva, Ill., died Nov. 20, 1906, after a long illness.

JAMES H. O'CONNOR, 43 years old, a dentist of Worcester, Mass., died Oct. 25, 1906, after a brief illness.

JAMES A. SAMPSELL, 62 years old, a dentist of New Orleans, La., died Nov. 10, 1906, after a five years' illness.

JAMES L. SIMONDS, 82 years of age, a dentist of Dorchester, Mass., died Nov. 7, 1906, after a lingering illness.

FRANK CURRY SWIFT, 56 years of age, a dentist of New Haven, Conn., died Oct. 22, 1906, after an illness of several months from nervous trouble.

ETHAN FOSTER, a dentist of Union, S. C., is in a critical condition from a self-inflicted shot, according to newspaper report of Oct. 29, 1906.

FACTORS IN SUCCESS.—Your instruments, as well as your materials and your skill, are factors in your success.—L. D. CAULK, *Dental Brief.*

BANKRUPT.—Frank LeRoy Purdy, a dentist of Brookline, Mass., on Nov. 1 filed a petition in bankruptcy, with liabilities at $12,798 and assets at $6,074.

STERILIZATION OF CAVITIES.—In the sterilization of cavities, preparatory to filling, phenol sodique is unsurpassed. It does not injure the dentin, and being employed undiluted is prompt in action and always ready for immediate use.—*Dental Brief.*

INLAYS.—Cavities filled with inlays, owing to the adhesive setting of cement, are less liable to suffer fracture, and for that reason are practical in teeth of poor structure, something not particularly true of anchored fillings.—C. N. THOMPSON, *American Dental Journal.*

FISTULA: SINUS.—It is not correct to say that an abscess has a fistulous opening. A fistula is an opening that carries a normal secretion; a fistula never carries pus. If we have an opening from an abscess carrying pus, that is not a fistula but a sinus.—A. D. BLACK, *Dental Review.*

FATALITIES.—A man of Bluffton, O., expired in a dentist's chair, Nov. 6, while under the influence of chloroform.—Nov. 1, a man in Coshocton, N. Y., died from heart disease while in the dental chair.—Oct. 23, a man in Saskatoon, Sask., Can., died in the dental chair while under the influence of ethyl chlorid.

COPPER MATRIX.—The copper should be very carefully annealed before it is used. Cooling it in alcohol gives the copper a beautifully clean surface with a lead-like consistency. This matrix enables us to perform operations that absolutely restore normality to tooth and gums.—H. C. REGISTER, *Dental Cosmos.*

ATTACHING VULCANITE TO METAL PLATES.—I have found that pink rubber will become attached to a metal base more securely than will either red or black rubber. I have, since discovering this fact, used it altogether, and it separates but seldom, especially when studs or loops are used.—C. N. THOMPSON, *Dental Review.*

DAMAGE SUITS.—A woman of Cohasset, Mass., was given a verdict of $12,000 against a dental firm of Boston. She claimed to have contracted blood poison while having her teeth treated by an employe of the defendant.—A man of Roxbury, Mass., is suing a dentist of Boston for $1,000 damages for extracting two teeth instead of one.

IMPACTED THIRD MOLAR TEETH: DIAGNOSIS.—Note the thickness of the tissues; the amount of process involved; the presence of any foreign body; the direction in which the tooth lies; its relation to the second molar, and the duration and magnitude of the disturbance. The diagnosis of a partial impaction can be made in the majority of cases with an explorer; the tissue is retracted, the size of the crown noted and the direction of the roots ascertained.—GEO. W. WINTER, *Dental Era.*

To Clean Wax.—After melting and straining, boil the wax for 20 minutes in a solution composed of half-ounce oxalic acid to each quart of water. Old wax may be made cleaner than new. Two drops of oil of cassia added to each pound keeps wax aseptic and renders it less unpleasant to the patient.—Thos. Fletcher, *Pacific Medical Journal.*

Asepsis in Root Canal Filling.—I always use a pair of sterile tweezers to handle my guttapercha points, and in place of chloro powder I use betanaphthol, which dissolves in chloroform, and mix the same with my osteo covering. With these precautions I feel that I have given longer life to my pulpless teeth.—W. J. Law, *British Dental Journal* (*Brief*).

Obtunding Sensitive Dentin.—After the dam is in position, and the cavity dried out as well as can be with cotton and spunk, dip a piece of spunk in carbolic acid and place in cavity; then heat a burnisher or ball-headed plugger and apply to spunk, gently at first and then with pressure, and repeat till all sensation is gone.—Y. T. Coghlan, *Western Dental Journal.*

Precipitated versus Prepared Chalk.—*Precipitated chalk* is perfectly neutral in reaction and does not alter on standing in air. *Prepared chalk* contains a larger proportion of mineral matter and is liable to be gritty and is more often adulterated with ground gypsum. It should not be used as an ingredient of a dentrifice.—Henry H. Boom, *Stomatologist* (*Brief*).

Loose Teeth.—In a large percentage of cases if the peridental membranes and gums are freed from infectious accumulations the loose teeth will tighten, and the stripped gums will of themselves reattach to the roots. The one and only effective means of removing these infectious masses is by instrumentation and polishers.—Joseph Head, *The Dentist's Magazine.*

A Water-tight Gold Filling.—Prepare cavity as if for inlay; dry and line with thin cement. Cut a piece of No. 30 or 40 gold foil as though for matrix for inlay; put it down in the cavity and fill with any cohesive gold preferred, condense thoroughly with hand-pluggers and finish in the usual way—makes gold filling easy and sure.—W. Thompson Madin, *British Dental Journal.*

Die for Gold Crown Work.—If impression material, prepared by mixing 12 ounces fine plaster with 3 ounces fine marble dust and 1 ounce whiting, is used for the impression, using a small pinch of sulphate of potash to hasten the setting, a fusible metal compound of 5 parts of bismuth, 3 parts of lead and 2 parts of tin can be poured without delay.—W. T. Wallace, *Items of Interest.*

Attaching Teeth to Plate.—In a case where teeth have been repeatedly broken from the plate the following method proved successful: Use long-pin plate teeth for six anterior teeth, back and edge as for bridge, articulate and solder together, then solder platinum wire back of teeth for an anchorage to rubber base, and proceed as usual with rubber plate.—C. A. Bent, *American Dental Journal.*

ARGYROL FOR PUS POCKETS.—After the removal of deposits syringe the pockets with warm water and inject freely a 20 per cent. solution of argyrol. This is a thorough non-irritating disinfectant and invariably prevents soreness following the surgical treatment. It is the only drug I find necessary in the treatment of pyorrhea, aside from a good mouth wash.—A. F. JAMES, *Dental Review.*

PERFECT SWAGED CUSPS.—After a piece of gold has been swaged into lead counter, remove and anneal, placing back in counter, with a piece of rubber dam doubled between the lead counter and gold. Put die in place and strike hard. Cusps will be found very sharp and close fitting. Take care not to get rubber between gold and die instead of gold and lead counter.—*J. S., Pacific Dental Gazette.*

THAT TERRIBLE ODOR.—In opening a tooth with putrescent pulp, where the odor is something terrible, just apply to the cavity a small pledget of cotton previously dipped in terebene and the offensive odor will change to that of attar of roses. Terebene is an antiseptic liquid manufactured by P., D. & Co. An original bottle is sufficient for two or more dentists. —H. B. DAVIS, *Dental Record.*

PRICE OF RADIUM.—Henri Farjas, of Paris, in his latest list of radium preparations, quotes the following prices: Pure radium bromid, one milligramme, $80; one centigramme, $800; one decigramme, $8,000; one gramme, $80,000. To this must be added the import duty of 25 per cent. At this rate the commercial value of one grain of radium in the United States would be more than $5,000.—*Dental Era.*

MASTICATION.—Dr. Cannon emphasizes the fact that ulcerations of the stomach occur from the rubbing and scratching of rough, unchewed stuffs in this part; also that this persistent irritation from the unchewed particles is a potent factor in the etiology of cancer of the pyloric. These results alone would be sufficient to establish the fact that teeth are essential to civilized man.—C. M. WRIGHT, *Dental Era (Brief).*

PULP REMOVAL.—Where disintegration is just beginning and there is danger that the pulp tissue will be torn and not removed entirely I find it an excellent practice to flood the canal with alcohol as a dehydrate, alternated with warm air, and keep on evaporating until the pulp tissue is dried up to a certain extent, when the broach will take hold of it and remove it entirely.—M. L. RHEIN, *Pacific Dental Gazette.*

TO ETCH THE SURFACE OF A GOLD INLAY.—I have discovered a quick method to roughen the surface of a gold inlay without distorting it in any way. After the inlay has been completed and is ready to set, dip the part to which you want cement to adhere in mercury. Be sure that the surface is evenly coated. This may be accomplished by taking a pellet of moist cotton with a pair of pliers and spreading the mercury around. Then invert over an alcohol flame and slowly drive off the mercury, this leaving a rough crystalline surface to which the cement will readily adhere.—C. J. HADLEY, *Dental Review.*

BRIDGE ABUTMENT FOR ANTERIOR TEETH.—A new attachment especially adapted to canines, though it may be used on centrals and laterals, consists of a gold inlay through which runs an iridio-platinum wire post fitting into the root canal and extending approximately to support the bridge. It is confined entirely to the lingual surface, shows no gold and offers no obsruction to a close bite.—JOHN O. MCCALL, *Dental Cosmos.*

A COMBINATION FILLING.—Pure gold built into a layer of soft cement, first using soft gold, then cohesive foil, and where subject to abrasion finishing with gold-platinum foil, forms a combination magnifying the good qualities and minimizing the faults of each of the ingredients. The cement is adhesive, the soft gold gives close adaptation to cavity walls and margins, the cohesive gold resists lateral stress in contour, and the alloy of gold and platinum resists abrasion.—CLYDE DAVIS, *Dental Summary.*

ETHICS.—I don't think we need any special system of ethics for dentists. We do need, however, more education and training, owing to the fact that the moral faculty is not innate and, therefore, subject to the improvements we really desire. The more one knows the less he goes astray; the more informed men are the more they agree together. We must take heed and not allow these hustling, selfish, modern, commercial attributes to stain our profession any further.—ALFRED OWRE, *Dental Review.*

SILVER NITRATE STAINS.—The silver nitrate stain is very superficial. Hard or healthy enamel will not stain; only decayed or softened enamel takes the stain. Tincture of iodin will assist in removing the stain from the teeth. This treatment, following the application with hard polishing, will make any tooth harder, whiter and brighter. Should the silver nitrate be accidentally brought into contact with the hands or face, tincture of iodin, followed with aqua ammonia, will remove it.—WM. CONRAD, *Dental Cosmos, (Brief).*

ACCIDENTS.—A vulcanizer exploded in the office of J. H. Haight, a dentist of St. Louis, Mo., but, aside from the molten wax burning his face, no damage was done.—F. L. Smith, a dentist of Chillicothe, O., was seriously burned about the face, Nov. 1, while filling a reservoir with calcium carbide gas.—Nov. 8, a grocer of Cincinnati had a severe coughing spell which expelled some false teeth which had been lodged in his throat. He had been treated for consumption and catarrh, not knowing he had swallowed the teeth.

ILLEGAL PRACTITIONERS.—Oct. 18, a man was arrested in Fresno, Cal., for practising dentistry without a license.—Oct. 27, a man was arrested in New York City for practising dentistry without a license. This is his second offense.—Oct. 26, a man at Tiffin, O., was fined $50 and costs for practising dentistry without a license.—Oct. 30, a man in Cleveland, O., was fined $50 and costs for practising dentistry without a license.

ROBBERIES.—R. Wentworth Browne, New London, Conn., Nov. 2; loss, $30 in gold.—T. T. Smith, Canton, Ill., Oct. 28; loss, $50 in gold.—A. M. Ford, Boone, Ia., Oct. 30; loss, $15.—Dr. Haggerty, Dubuque, Ia., Oct. 31, $10.—E. C. Bock, Fairfield, Ia., Oct. 26; loss, $60 in gold.—Drs. Punton and Edwards, Mt. Pleasant, Ia., Oct. 25; loss, $12.—Brockton Dental Co., Brockton, Mass., Oct. 21; loss, $350.—Frederick Miller and James F. Moon, Nov. 2, Paterson, N. J.; loss, $100 and $45, respectively.—J. N. Christensen, Salt Lake City, Utah, Nov. 1; loss, $90 in gold.

SKIAGRAPHS AS AN AID IN CROWNING ROOTS.—Drilling into roots for the purpose of inserting posts for crowns is most treacherous work. Where advisable, we drill a certain distance only, insert a post, and skiagraph and then we learn whether or not we are drilling in the right direction or are dangerously near the apex or side. Again, whether or not a root is sufficiently strong to warrant crowning is sometimes a matter of doubt, and under these circumstances we skiagraph the case, and upon the results shown we base our conclusions.—C. EDMUND KELLS, JR., *Dental Review.*

METHOD OF REMOVING AN UNBAKED INLAY FROM THE CAVITY.—In a recent operation where I used Opaque Porcelain in a posterior tooth I lessened the difficulty of removing the inlay from the cavity by imbedding in the center of the unbaked inlay while in the cavity, a small and fine piece of platinum wire, which I used as a handle to aid in removal. When the inlay was baked and cemented to the cavity I cut off the wire with a sharp steel instrument, the wire being so fine that it did not show in the inlay.—E. M. S. FERNANDEZ, *Dental Review.*

ANTISEPTIC AND ANESTHETIC PASTE.—

℞. White Vaseline	℥ j
Cocain	grs. xiv
Menthol	grs. xxiv
Oil of Peppermint	grs. x
Chloretone	grs. jx
Phenol	grs. ij

Mix and apply before scaling the teeth by rubbing it into the spaces between the teeth and on the gums.—*Register.*

GOLD SOLDERS.—Gold solders are intended primarily for use with the corresponding grades of gold plates, with which they agree in color and strength. In case two grades of solder are used in one piece of work, the higher grade should be employed in the first operation to prevent its being fused in those which follow. The schedule below shows the grades of solders commonly used for the various operations: 18-k and 20-k for crowns and bridges except for places exposed to view, in which 22-k is preferable, because it agrees with the 22-k plate in color; 14-k for filling in cusps of seamless single crowns; 20-k, 18-k and 16-k are all used in original metal plate work; 16-k and 14-k are commonly used in making repairs, to avoid unsoldering joints in good condition.—*Western Dental Journal.*

REMEDY FOR USE IN TREATING DECIDUOUS TEETH.—In my hands the most satisfactory remedy is a solvent or digestant, manufactured by a reliable firm, not commonly accepted as a proprietary medicine, known as Caroid Solvent—a permanent solution of vegetable proteolytic ferment. Following the use of this and at intervals of several days, while sealed in the cavity, the tooth may be filled, but it is often well to prepare a vent by puncturing the tooth on the buccal surface. Should our efforts fail after this procedure, rather than extract the tooth, it is often desirable to remove all the crown portion with a bur and allow the roots to remain.—GRAFTON MUNROE, *Dental Review.*

TO REMOVE A POST CROWN.—I find that post crowns may be most easily and satisfactorily removed by the use of an excising forcep. Place the cutting edge of the beaks in the joint between the root and crown—one on the lingual and one on the buccal side, as in the excision of a tooth. Now, by applying a little force and twisting the forceps a little, the sharp beaks force themselves into the joint and because of their wedge shape the crown gradually "lets go" until it is loose.

Post-crown bridges may be removed in the same manner by loosening each abutment a little at a time.—J. F. NELSON, *Western Dental Journal.*

USES OF PLATINUM IN DENTISTRY.—Gauges 29 to 30 are used for forming seamless crowns for porcelain work. Gauges 30 to 32 for collars for crowns. Gauges 28 to 30, or as some prefer, gauge 34 reinforced at points where greater rigidity is required, are used for continuous gum work. Platinum and gold collars are formed of platinum of gauges 33 to 34, stiffened by flowing over it pure gold. The heavy (hard) numbers of platinum wires are used for posts and such other purposes as require rigidity; the smaller (soft) numbers, as gauges 26 to 29, for wiring furnace muffles; gauge 30 for ligatures. Platinum foil, 1-1000 of an inch in thickness, is used for making matrices for inlays of high-fusing porcelain.

MARRIAGES.—H. D. Cook, a dentist of Fort Pierre, S. D., was married Oct. 20 to a young woman of Red Oak, Ia.—E. A. Foote, a dentist of Elizabethtown, N. Y., was married to Miss Frances Hale of Saranac Lake, Oct. 23.—Joseph Henninger, a dentist of Chicago, and recently divorced, was married to Mrs. Walter McCullough at Macon, Ga., Oct. 28.—Wm. K. Moeller, a dentist of Devil's Lake, N. D., was married to Miss Lilly Shebley of Minneapolis, Oct. 22.—C. Allen Porter, a dentist of Brockton, Mass., was married to Miss Isabelle N. Thomas of Middleboro, Oct. 29.—Wallace C. Shearer, a dentist of Portland, Ore., was married to Miss Edna W. Boss of Portland, Oct. 10.—Herbert E. Snow, a dentist of Hartford, Conn., was married to Miss Carrie Stratton Albee of Orange, Mass., Oct. 27.—Andrew A. Spears, a dentist of Brazil, Ind., was married to Miss Laura Morgan of Brazil, Nov. 1.—E. Edwin Whitmer, a dentist of Newport, Pa., was married to Mrs. Belle E. Little of Niagara Falls, N. Y., Oct. 23.—Fred Ellis Wilkens, a dentist of Berkeley, Cal., was married to Miss Nevada Harlan of Geyserville, Oct. 22.

ELECTRIC OVENS. I have always maintained that so far as possible all the walls of an electric oven should be covered with heat producing wires. I do not believe that in these ovens we are consistent with the nature of things when an oven is made with an open front or one of the walls not a heat-producing surface. This is not only essential for the even fusing of the porcelain, but for the life of the oven. The heat of an electric oven is obtained by radiation from every wire. Just in proportion as we cover all walls with wire and these wound as closely together as would be safe from buckling into lateral contact will the required heat of the individual wire be lower and the life of the oven be longer.—L. E. CUSTER, *Dental Review.*

TESTING AN ELECTRIC FURNACE.—Every user of an electric furnace should provide for testing his muffle in case of failure to operate. This is easily done by taking a few feet of the ordinary electric light wire connected with a plug at one end and a small copper or brass point on each of the other ends. One of these wires should be cut and a lamp put in. The lamp will light up when points are brought into contact with the two terminal wires in the muffle if the wire is not burned out or broken. Some such arrangement will also prove to be a very great help in locating a break in case of repair. Where the wire has burned out there will usually appear a spot, but a break will not show and a tester is indispensable. In the majority of cases the burn will occur within three or four inches of the negative end of the wire, due to the excessive heating of the wire at that point.—F. E. ROACH, *Dental Review.*

OFFICIAL TOOTH-BRUSHES AND DENTRIFICES.—We recently mentioned an instance of what we believed to have been the first official tooth powder, as prescribed in one of the French public services, but we understand there has been, for at least two years, a semi-official prescription in our own Navy and Army. It appears that Mr. Thomas Atkins is provided with a national tooth-brush, but has to purchase the powder. Of the latter, the one most accessible and economical to him was a much advertised proprietary article retailed in the regimental "grocery" at about 4½d. (nine cents) per very small tin. Some two years ago, an active member of the Army Dental Corps, with the cooperation of the Professor of Dental Surgery of the R.A.M.C., arranged with one of the largest contracting firms for the supply of an approved and guaranteed powder, selling at 1½d. and 2½d. (three and five cents), respectively, for 1 oz. and 2 oz. tins. The formula is:—

℞. Ol. caryoph..... m x.
Acidi carbol..... m xx.
Pulv. pot chloratis..... gr. xl.
" sap. dur..... gr. lxxx.
Calc. carb. precip..... ad. ℥j.

which is similar to one in the Guy's Hospital Pharmacopœia, and arranged as above written, for "remembrance." The preparation is not, perhaps,

ideal, as the proportion of soap and the flavor of cloves is not to all tastes, but, nevertheless, this "Army tooth powder," or "Navy tooth powder" as it is known in the services, is, we find, used to a considerable extent by both officers and men. The makers are required to guarantee B.P. standard, and it is, by their contract, liable to analysis at any time.—*British Dent. Jnl.*

Copper for Matrices.—Obtain a matrix in ordinary manner, using thin copper plate. For small cavities, fuse matrix nearly full of 18-K. gold solder by holding in flame of the alcohol lamp. Replace in cavity and burnish well to cavity margins; remove and add solder until flush with margins. For large inlays, it is necessary to invest. Place a *fold of small copper wire in bottom of matrix,* and run up with gold solder, using plenty of flux; grind nearly complete before setting and, last of all, drop the inlay into nitric acid to remove the copper. The copper wire having been removed by the acid leaves a good retaining groove. Do not grind after removing from the acid until after inlay is set, as there would be danger of injuring the sharp marginal edges. These edges should be carefully burnished to the tooth while cement is soft. There are advantages in this method more patent than simply the price of the material.—V. B. Newell, *Dental Review.*

Columbus (Ohio) Public Dental Library.—The local dentists of Columbus have organized a Dental Library Association, in connection with the room which has been set apart as a dental and medical library in the new Carnegie library building. The Columbus dentists have already donated $500 in cash and a number of books and magazines. It is hoped that by the cooperation of all the dentists of the state, as well as of those throughout the profession generally, this library may become a center for all works relating to dentistry, and thus become an invaluable means for reference and research work. Any old and rare works, copies of old journals, etc., will be gratefully received, inscribed with the name of the donor and recorded to his credit in the library catalogue. Dr. Edward C. Mills of the Y. M. C. A. Bldg., Columbus, is secretary of the Association and will be pleased to furnish any desired information concerning this worthy object.

Tooth Brushes for School Children.—The children in many large parochial schools are duly provided with tooth brushes, and those who are in a position to know think that much good results. Mr. Cadbury regards the question of the proper care of the teeth as most important, and has demonstrated as much by retaining a resident dentist in connection with the works of the firm of Cadbury Bros. at Bournville, England. He is now anxious to provide some five or six thousand of the school children of the King's Norton district with tooth brushes and tooth powder as a means of arresting physical deterioration, and has called the head teachers into conference with him, and the question has been fully discussed. The teachers, while acknowledging the importance

of preserving the dental apparatus unimpaired, do not altogether relish the proposed addition to the school curriculum. They see a good many practical difficulties in the way, and one said that there was only one drinking cup in her school. Therefore the teachers have promised to deliberate among themselves and inform Mr. Cadbury of their conclusions.—*British Jnl. Dental Science.*

SYPHILIS OF THE MAXILLÆ IN ITS RELATION TO DISEASES OF THE DENTAL ORGANS. BY DR. MOUTON. [*Clinique de Bruxelles,* March 17, 1906.]—It is of considerable importance to the practitioner of medicine and that of dentistry, to be thoroughly familiar with the characteristics of syphilitic manifestations in the buccal and facial regions of the maxillæ, as otherwise it is possible to reach such an erroneous diagnosis as to lead to the partial or total resection of the maxillæ. At first, a syphiloma may develop unnoticed; during the period of tumefaction marked edema is present, and the swelling, which is hard if in the palatal or canine region, may simulate a dental abscess or cyst. During the period of ulceration the symptoms are more defined, a cavity being formed which becomes filled with a serous and sanguineous purulent secretion.

The margins of the cavity are ragged, red and soft, and bleed upon the slightest provocation. Numerous fistulæ often appear leading from necrosed areas—the source of suppuration.

Prior to the ulcerative stage, a correct diagnosis can be reached only by a process of exclusion, and the syphilitic manifestations should not be confounded with sinusitis, cysts, or abscesses. In cases of syphilis of the maxillary sinus, if accompanied by pain that symptom will manifest itself especially at night, but even then will not be very intense, the progress being slower here than in sinusitis of non-syphilitic origin. A differential diagnosis should also be made between its syphilitic manifestations, sarcoma of the arch, and actinomycosis. In sarcoma of the arch the teeth are gradually shed, and the edentulous arch has a deep red and fleshy appearance.—*Dental Cosmos.*

DIFFERENTIAL DIAGNOSIS OF TRIGEMINAL NEURALGIA. BY DR. GUERARD. [*Revue générale de l'Art Dentaire,* Paris, April, 1906.] After reviewing the anatomical charactertistics of the trifacial nerve, the author enumerates the pathological conditions of buccodental origin capable of causing neuralgia or disturbances simulating this disorder. Incidentally the author recalls the areas in which the pain in trifacial neuralgia is most likely to become localized. These "neuralgic points" in the maxilla are the infraorbital, molar, upper lateral, dental, and palatal, and in the mandible the mental, auriculotemporal, labial, lingual, and dental. In the etiology of trifacial neuralgia one of the most important factors to be considered is dental caries. Next in importance follow the pathological evolution of the third molars, odontomes, neuritis, osteoperiostitis, osteomyelitis, and necrosis of the maxilla or mandible. In edentulous people the clinican should bear in mind that neuralgia is frequently caused by compression of the nerve filaments of the alveolar border through osseus deposition. Inflam-

matory disturbances of the maxillary sinus may likewise be the source of neuralgia through compression of the twigs from the posterior superior dental branches which supply the lining membrane of the sinus. A differential diagnosis between trifacial neuralgia and pain due to such causes as hypersensitive dentin, exposed pulps, etc., is entirely too elemental a feature of dental pathology to require any reference in this review, although one phase of this question is of especial importance to the patient, namely, reflex pain due to compression of the pulp by calcific formation, which can be diagnosed only by a process of careful exclusion. Trifacial neuralgia should not be confounded with hysterical cephalagia, migraine, temporomaxillary rheumatism, cutaneous hyperesthesia, tic douloureux, infection, autointoxication, diathetic manifestations, etc.—*Dental Cosmos.*

Operative and Prosthetic Hints.—To make the piece of gold plate stay on the Mellotte's metal die while swaging the top to a crown, wet it.

To carve a plaster model easily, soak the plaster in water; to remove plaster from a band, heat it and drop it into water.

A good pickling outfit can be made by taking a large-sized cigar box, fill it two-thirds full of plaster mixed fairly thin, and while it is still soft set in it three common crockery cups. When the plaster is set, these can be removed and cleaned, and when in their place cannot be tipped over. One is for acid, the next for bicarbonate of soda solution, and the third for plain water, and the cover of the box keeps everything clean.

A stock solution of whiting or yellow ochre in alcohol is handy to coat the surfaces upon which you do not wish the solder to flow. This same solution is useful as a separator for Mellotte's metal dies. Vaseline on strips and disks prevents them from catching in the rubber dam, and they will not heat, and if kept will bring a few easy dollars from the refiner.

A piece of car rubber cut in suitable sizes makes good mouth props. These can be sterilized by boiling and easily shaped to suit any case.

Tripoli makes an ideal substance for polishing.

A large glass tube, such as Rowan's gold comes in, is useful for a test tube in which to boil small pieces, such as crowns and small bridges, and can be used as a pickling dish for small pieces.

A hollow rubber ball cut in half makes a bowl to mix plaster, a receptacle for nitric acid, an impression tray.

A piece of cotton placed above the soft rubber in pressure anesthesia prevents the rubber from squeezing out all around the instrument with which the pressure is made.

Piano wire broaches from which the temper has been drawn, and to the fine point of which has been added a little ball of solder, are useful as probes with which to follow a fistulous opening.

A cavity for a gold filling for artificial teeth can be made by cutting two grooves with a disk so that they make a dovetail, and then filling with plastic gold to any shape that is desired, burnishing it on the tooth rather than in a cavity.

A rubber plate which has been bent out of shape will return to its original

shape if dropped in hot water and kept there a few moments.—*Pacific Dental Gazette.*

NEW VIEWS ON THE DISINFECTION OF THE HANDS AND SKIN.—The old method of cleaning the hands by scrubbing them with soap and water is attacked by Schumburg in the *Archiv fuer klinische Chirurgie,* says the *Therapeutic Gazette,* on the basis of experiments. He found that in many cases the hands showed more bacteria after scrubbing than before. He ascribes this to the bringing of bacteria from gland crypts to the surface. The subsequent scrubbing by bichlorid did no good and only roughened the skin. Washing the hands in absolute alcohol for one and a half to two minutes removed almost all the bacteria, average remaining one-half of one per cent. Wood alcohol had about the same effect. Ether used in the same way was not so effective. A mixture of two parts of alcohol to one of ether was more effective than either alcohol or ether alone, and its action is improved by the addition of one-half per cent HNO_3. Rubbing the hands for one and a half minutes with gauze pledgets soaked in such a mixture reduced the bacteria to two-tenths per cent. on the average. About 100 cubic centimeters should be used. Sweating after this cleansing brought very few bacteria to the surface. Gauze pledgets are preferable to brushes. The use of an antiseptic after washing has little effect, but a 5 per cent. solution of hydrogen peroxid reduced the number of bacteria in some cases. Experiments with tincture of green soap showed that it often removed 90 per cent. of the bacteria, but Schumburg believes this is due to the alcohol rather than to the soap.

Elsewhere in the same journal it is stated that Heusner has decided, after a series of experiments, that a solution of iodin in benzine was the best liquid for washing the hands to insure their freedom from bacteria. A series of tests showed freedom from germs in 73 per cent. as compared to 52 per cent. by the best of the older methods. Benzine is about as potent a bactericide as alcohol, and the iodin is a very powerful antiseptic. For ordinary purposes a 1-to-1000 solution of iodin in benzine is sufficient; a stronger solution may discolor or irritate the skin, while this does not. The technique is as follows: For each operator 300 CC of the solution is poured into a porcelain basin, and in this the hands are brushed for five minutes, a preliminary washing with water not being needful. The hands are then scrubbed with gauze pledgets in a fresh solution, and finally are rubbed with 2-to-1000 vaseline. Care must be taken in washing the patient that benzine does not run down and so collect that dependent parts of the body are continually wet with it, as it may blister. To prevent this all delicate parts should be smeared with vaseline before the disinfection, and for all very tender skin surfaces the benzine should be mized with equal parts of liquid petrolatum before using. The iodin solution may be used without fear over cut surfaces, and if the sutures are rinsed in it before using the number of stitch abscesses is markedly reduced.—NATIONAL DRUGGIST (*Dental Era*).